

**ACTUARIAL VALUATION REPORT**

*as of*

*JUNE 30, 2013*



*New York State Teachers' Retirement System*

**Office of the Actuary**  
**July 10, 2014**

# NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

## Actuarial Valuation Report as of June 30, 2013

### TABLE OF CONTENTS

A.	INTRODUCTION.....	1
B.	EMPLOYER CONTRIBUTION RATE .....	1
C.	GAIN/LOSS IN THE EMPLOYER CONTRIBUTION RATE.....	3
D.	EMPLOYER CONTRIBUTION RATE HISTORY .....	4
E.	EMPLOYER CONTRIBUTION RATE INCREASE.....	5
F.	MEMBER DATA .....	5
G.	FUNDED STATUS.....	6
H.	ACTUARIAL EXPERIENCE .....	6
I.	NEW LEGISLATION .....	7
J.	STABLE CONTRIBUTION OPTION.....	8
K.	SENSITIVITY ANALYSIS .....	9
L.	FUTURE EXPECTATIONS .....	9
M.	CERTIFICATION .....	11

### APPENDICES

1.	RECONCILIATION OF THE ACTUARIAL VALUE OF ASSETS.....	12
2.	COMPARISON OF MARKET VALUE TO ACTUARIAL VALUE OF ASSETS .....	13
3.	ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS .....	14
4.	FUNDING PROGRESS.....	15
5.	EMPLOYER CONTRIBUTION RATE .....	16
6.	MEMBER RECONCILIATION.....	26
7.	DISTRIBUTION OF ACTIVE MEMBERS .....	27
8.	HISTORICAL MEMBER STATISTICS .....	30
9.	RETIREMENT STATISTICS .....	31
10.	2009 – 2013 EXPERIENCE STUDY .....	34
11.	ASSET ALLOCATION .....	48
12.	SENSITIVITY ANALYSIS .....	49
13.	HISTORY OF THE EMPLOYER CONTRIBUTION RATE.....	50
14.	HISTORY OF THE MEMBER CONTRIBUTION RATE .....	51
15.	ACTUARIAL COST AND ASSET VALUATION METHODS .....	53
16.	PRESENT ACTUARIAL ASSUMPTIONS .....	54
17.	SUMMARY OF BENEFIT PROVISIONS .....	75

# NEW YORK STATE TEACHERS' RETIREMENT SYSTEM

## Actuarial Valuation Report as of June 30, 2013

### A. INTRODUCTION

This report presents the results of the annual actuarial valuation of assets and liabilities of the New York State Teachers' Retirement System as of June 30, 2013. The purpose of this report is to summarize the determination of the Employer Contribution Rate which will be applied to member salaries earned during the July 1, 2014 to June 30, 2015 fiscal year and to review the funded status of the Retirement System. Use of the valuation results contained herein for purposes other than those stated above may not be appropriate.

### B. EMPLOYER CONTRIBUTION RATE

The Employer Contribution Rate to be applied to member salaries for the July 1, 2014 to June 30, 2015 fiscal year and collected in the fiscal year ending June 30, 2016 consists of four components. These components may be described as follows:

The **Normal Rate** represents the annual cost of accruing active member benefits as well as incorporating actuarial gains and losses. The active member component includes the cost of benefits accruing on account of retirement, withdrawal, disability, death (except for benefits funded by the group life insurance rate) and the cost-of-living benefit provided during retirement.

The **Expense Rate** is a one-year term rate representing the administrative cost of the Retirement System and is set during the budget process.

The **Group Life Insurance Rate** is a one-year term rate representing the cost of the first \$50,000 of member death benefits.

The **Excess Benefit Plan Rate** is a one-year term rate representing the cost of benefit payments in excess of the Internal Revenue Code Section 415 limits.

The actuarially computed Employer Contribution Rate to be applied to the member salaries for the fiscal year ending June 30, 2015 is **17.53%**. The Employer Contribution Rates determined by the actuarial valuations as of June 30, 2013 and June 30, 2012 and the changes between the two are summarized below:

	As of <u>6/30/2013</u>	As of <u>6/30/2012</u>	<u>Change</u>
Normal Rate	17.13%	15.85%	+1.28%
Expense Rate	0.27	0.27	0.00
Group Life Insurance Rate	0.13	0.13	0.00
Excess Benefit Plan Rate	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
Employer Contribution Rate	<b>17.53%</b>	<b>16.25%</b>	<b>+1.28%</b>

The actuarial assumptions in use for the June 30, 2013 actuarial valuation were developed primarily based upon Retirement System experience and were adopted by the Retirement Board on October 27, 2011.

As in prior years, the actual employer contributions made by participating employers during the fiscal year ending June 30, 2013 were equal to the employer contributions determined in accordance with the annual actuarial valuation. Additional payments are made by certain participating employers as required by statute for participation in early retirement incentives.

### C. GAIN/LOSS IN THE EMPLOYER CONTRIBUTION RATE

The Employer Contribution Rate of 17.53% represents a 128 basis point increase over the prior year's rate of 16.25%.

#### NORMAL RATE

The Normal Rate component of the Employer Contribution Rate has increased by 128 basis points over the prior year's rate. This change may be broken down as follows:

<b><u>Salary/Service:</u></b>	This gain is due to salary and service data coming in lower than expected.	-0.49
<b><u>Net Investment Loss:</u></b>	The investment return on the actuarial value of assets was approximately 5.28% which was less than the 8.0% expected return.	+1.75
<b><u>New Entrants:</u></b>	New entrants joined the Retirement System with a long-term expected normal rate of approximately 7.5% for Tier 5 and approximately 4.4% for Tier 6 which compares favorably to the current normal rate of 17.13%.	-0.11
<b><u>Withdrawal:</u></b>	More members withdrew than expected.	-0.06
<b><u>Mortality:</u></b>	Members are living slightly longer than expected and receiving benefits for a longer period.	+0.04
<b><u>Retirement:</u></b>	Members retired in accordance with assumed rates.	0.00
<b><u>Pension Payments:</u></b>	Actual payments to retirees were greater than expected.	+0.17
<b><u>Cost of Living Adjustment:</u></b>	The actual COLA increase of 1.0% was lower than the expected increase of 1.625%.	<u>-0.02</u>
<b><u>TOTAL CHANGE IN THE NORMAL RATE</u></b>		<b>+1.28%</b>

## OTHER COMPONENTS

The **Expense Rate** is set during the budget process and is unchanged from the previous year.

The **Group Life Insurance Rate** is unchanged from the previous year. Although the premiums collected have generally been more than sufficient to cover payments over the past several years, this rate is being held constant in anticipation of rising payouts in the future due to Tier 2, 3, 4 ,5 and 6 post-retirement death benefits and the inactive death benefit.

The **Excess Benefit Plan Rate** remains unchanged from the previous year. This rate represents the retirement benefits paid in excess of the Internal Revenue Code Section 415 limits. These payments are made exclusively from the Excess Benefit Plan. This fund was established in accordance with the Excess Benefit Plan which received final IRS approval in August 2001. It is anticipated that the current fund balance is sufficiently large to cover at least two years' worth of payments, allowing us to keep this component equal to 0.00% in this year's Employer Contribution Rate.

### **D. EMPLOYER CONTRIBUTION RATE HISTORY**

The following chart summarizes the Employer Contribution Rate for the last 20 years:

<i>Salary Year</i>	<i>Employer Contribution Rate</i>	<i>Salary Year</i>	<i>Employer Contribution Rate</i>
1995-1996	6.37%	2005-2006	7.97%
1996-1997	3.57	2006-2007	8.60
1997-1998	1.25	2007-2008	8.73
1998-1999	1.42	2008-2009	7.63
1999-2000	1.43	2009-2010	6.19
2000-2001	0.43	2010-2011	8.62
2001-2002	0.36	2011-2012	11.11
2002-2003	0.36	2012-2013	11.84
2003-2004	2.52	2013-2014	16.25
2004-2005	5.63	2014-2015	17.53

The complete Employer Contribution Rate history is presented in Appendix 13.

## **E. EMPLOYER CONTRIBUTION RATE INCREASE**

The Employer Contribution Rate has increased this year from 16.25% to 17.53%, representing an increase of approximately 8%. The Normal Rate component equals 17.13%, an increase of approximately 8% over the prior year's Normal Rate of 15.85%. The rate of return on the System's market value of assets for the fiscal year ending June 30, 2013 was 13.7%, and the System's five-year market value rate of return now stands at 5.2%. While the asset smoothing method did help to dampen the initial impact of the large 2009 investment loss on the Employer Contribution Rate, this loss continues to exert an upward pressure on the rate. Actuarial losses on account of investments is the primary reason for the increase in the rate in recent years, and for the increase in this year's rate.

## **F. MEMBER DATA**

The member data for the valuation was determined as of June 30, 2013. Compared with the previous year, the total number of members decreased slightly from 427,085 to 426,150; the number of active members decreased from 277,273 to 273,328; the number of retired members increased from 144,438 to 147,291; and the number of beneficiaries receiving monthly benefits increased from 5,374 to 5,531.

The number of retirements increased from 6,033 during the 2011-2012 fiscal year to 6,330 during the 2012-2013 fiscal year. There was no early retirement offered in the 2012-2013 fiscal year. The number of retirements over each of the last ten years is as follows:

<i>Fiscal Year</i>	<i>Total Number of Retirements</i>	<i>Fiscal Year</i>	<i>Total Number of Retirements</i>
2003-2004	7,287	2008-2009	5,644
2004-2005	7,182	2009-2010	5,501
2005-2006	7,281	2010-2011*	8,423
2006-2007	6,900	2011-2012	6,033
2007-2008	6,330	2012-2013	6,330

\*Denotes an early retirement incentive offered during that fiscal year.

Historical member statistics, including statistics specific to retired members, appear in the appendices to this report. Additional member statistics may also be found in the Retirement System's most recent Comprehensive Annual Financial Report.

## **G. FUNDED STATUS**

As of June 30, 2013, the actuarial value of plan assets was equal to \$82.74 billion. The accrued pension benefit liability calculated in accordance with the Entry Age Normal Cost Method was equal to \$94.58 billion. These two values produced a funded ratio of 87.5% as of June 30, 2013. If the market value of plan assets is used instead of the actuarial value of plan assets, the funded ratio as of June 30, 2013 would be equal to 100.8%.

In accordance with Governmental Accounting Standards Board (GASB) Statement No. 50 "Pension Disclosures", the plan liabilities have been calculated in accordance with the Entry Age Normal Cost Method, for purposes of this funded ratio calculation. The Retirement System is funded in accordance with the Aggregate Cost Method. GASB requires that the Entry Age Normal Cost Method be used to calculate the accrued liability for purposes of presenting the funded ratio calculation for plans funded in accordance with the Aggregate Cost Method.

A history of the Retirement System's funded status is provided in Appendix 4 of this report.

## **H. ACTUARIAL EXPERIENCE**

Each year the Retirement System completes an experience study in order to regularly monitor the reasonableness and appropriateness of the actuarial assumptions used in the actuarial valuation. These assumptions are used to estimate the probability a member will cease teaching due to retirement, withdrawal, disability, or death. In addition, the assumptions are used to estimate future salary increases, future investment earnings, and the probability of death for retired members and beneficiaries. A summary of the results of the most recent experience study is contained in Appendix 10. The current actuarial assumptions were adopted by the Retirement Board on October 27, 2011, and first effective with the actuarial valuation of the Retirement System's assets and liabilities as of June 30, 2011.

The Retirement Board, in consultation with Retirement System staff and the external investment consultant, annually reviews the asset allocation policy to determine if any changes to



the policy are appropriate. According to the System's external investment consultant, the System's asset allocation as of June 30, 2013 produces a long-term (30-year) expected annual geometric rate of return of 7.4%, and an expected annual arithmetic rate of return of 8.3%.

The Retirement System's asset allocation, including targets and ranges, can be found in Appendix 11. Historical rate of return information can be found at the end of Appendix 10. Detailed investment information is available in the System's Comprehensive Annual Financial Report.

## I. NEW LEGISLATION

The following legislation affecting the Retirement System was signed into law during the 2013 Legislative Session:

### 1) **Stable Contribution Option:**

**Chapter 57 of the Laws of 2013** provided participating educational employers with a Stable Contribution Option commencing with the 2013-2014 fiscal year. Section J of this report contains specific details regarding this legislation.

### 2) **Annual Convention:**

**Chapter 436 of the Laws of 2013** allows the Retirement Board of the Retirement System to hold the annual convention of members, which elects the active teacher members of the Retirement Board, in either the month of October or November.

### 3) **Maximum Salary Used in Paragraph 2 Death Benefit Calculation:**

**Chapter 520 of the Laws of 2013** clarified the maximum salary used to calculate the paragraph 2 death benefit for Tier 2, 3, 4, 5 and 6 members of the Retirement System. The maximum salary used to calculate the paragraph 2 death benefit shall not be less than the maximum salary specified in Section 130 of the Civil Service Law, as added by Part B of Chapter 10 of the Laws of 2008, or the maximum salary specified in Section 130 of the Civil Service Law, as thereafter amended, whichever is greater.

## J. STABLE CONTRIBUTION OPTION

Chapter 57 of the Laws of 2013, enacted on March 29, 2013, provided the Retirement System with the ability to offer a seven-year Stable Contribution Option (SCO) to public school districts and BOCES in New York State. Eligible employers have the choice of either continuing to pay the actuarially required contribution (ARC) or electing to participate in the SCO and thereby pay a stable contribution rate for up to seven years and defer payment of the difference between the ARC and the SCO to later years. At a special Retirement Board Meeting held on April 9, 2013, the Retirement Board voted to make the SCO available to eligible employers in accordance with Chapter 57.

The following chart summarizes the provisions under the SCO:

<b>Year</b>	<b>Stable Rate<sup>1</sup> (per statute)</b>	<b>Applicable Payroll (school year)</b>
One	14.0%	2013-14
Two	14.0%	2014-15
Three	16.0% <sup>2</sup>	2015-16
Four	16.0%	2016-17
Five	18.0% <sup>2</sup>	2017-18
Six	18.0%	2018-19
Seven	18.0%	2019-20

<sup>1</sup> Rates shown are base rates as per statute. The actual rate will include a small additional charge to account for the group life insurance rate (currently 0.13%).

<sup>2</sup> The law grants the Retirement System's Board discretion to increase the rate by up to 2.0% in year three (to a maximum of 16.0%) and year five (to a maximum of 18.0%) if necessary to meet fiduciary obligations.

In Year One of the SCO, eligible employers who opt into the program will pay 14.13% of salary. This rate will apply to fiscal year 2013-14 member salaries and will be collected in the fall of 2014. In Year Two, the SCO rate will again be 14.13%. In subsequent years, the SCO rate will be a rate as adopted by the Retirement Board in accordance with the statute which provides that in Year Three and Year Five the rate may be increased by up to 2.0%. Additionally, the rate may be decreased in any year, but never below 14.0%.

Beginning in Year Six, repayment of the deferred amounts (difference between the ARC and the SCO rate) will begin over a five-year period. Interest will be calculated annually based on the monthly average yield on 10-year U.S. Treasury securities as of August 1 of the deferral

year, plus one percent. Beginning in Year Eight (2020-21) employers will return to paying the ARC as calculated by the Retirement System. Also in Year Eight, employers who participated in the SCO program for the duration will be required to make an additional deferral payment representing the beginning of a five-year payback for the differences between the ARC and the SCO rate in Years Six and Seven of the program.

Employers electing to participate in the SCO may opt out of the plan at any time. Those opting out will resume payment of the ARC and will be required to begin repaying any deferred amounts plus interest, over a period not to exceed five years.

Should the Retirement System's funded status fall below 80%, the SCO will terminate and all participating employers will resume paying the actuarially required contribution. In addition, employers will be required to repay any deferred amounts plus interest, over a period not to exceed five years. The window period in which eligible employers may opt into the SCO ran from July 1, 2013 to June 30, 2014. Ten participating employers elected to participate in the SCO out of 717 that were eligible.

#### **K. SENSITIVITY ANALYSIS**

Included in Appendix 12 is a Sensitivity Analysis. The purpose of this exhibit is to illustrate what the Employer Contribution Rate would have been had various actuarial assumptions been altered. The chart also gives the reader a feel for the significance of the assumptions on the valuation results, and the potential impact of modifying them.

#### **L. FUTURE EXPECTATIONS**

The next Employer Contribution Rate will be determined based upon the actuarial valuation as of June 30, 2014. The capital markets had strong returns during the fiscal year, with our main domestic equity index (S&P 1500) returning 24.7% for the fiscal year ending June 30, 2014, and the international equity index (ACWI ex-US) returning 21.7% for the fiscal year. The market value rate of return for the Retirement System's entire portfolio, though still only estimated, should be in the neighborhood of 16%. As a result of dropping the very poor '08-'09 return from the five-year average and replacing it with this year's return, the System's five-year annualized rate of return will grow substantially from last year's 5.2% to approximately 13%.

The System's five-year rate of return will exceed 8% for the first time since the June 30, 2008 fiscal year. This will end the System's streak of actuarial losses on account of investments, and very likely lead to the first decrease in the employer contribution rate in the last five years.


With respect to the June 30, 2014 actuarial valuation, although the Retirement System's liabilities as of that date are still to be determined, there has been no significant change in the benefit structure or in the actuarial methods or assumptions. The anticipated increase in the Actuarial Value of Assets makes it very likely that the actuarial valuation as of June 30, 2014 will produce an employer contribution rate less than the current 17.53% rate. Exactly how much less is difficult to estimate at this time, but quite possibly significantly less.

The window for employers to elect to participate in the Stable Contribution Option (SCO), an alternative funding plan, closed on June 30, 2014. Only ten of the System's 717 eligible employers elected to participate in the program. Due to the very low participation, the SCO will have a very minimal impact on System funding. The total estimated amount of deferred employer contributions in the fall of 2014 is estimated to be \$17 million, or 0.7% of the total anticipated contribution of approximately \$2.4 billion. The total estimated amount of deferred employer contributions in the fall of 2015 is estimated to be \$27 million, or 1.0% of the total anticipated contribution of approximately \$2.6 billion.

## M. CERTIFICATION

This actuarial valuation relies on member data provided by the participating employers to the Retirement System's administrative staff. The administrative and actuarial staffs review this data for reasonability as well as reconcile it against prior data. In addition, the valuation relies on financial data provided by the Retirement System's Finance Department. All data is reviewed by the Retirement System's independent auditors as part of the annual audit.

The benefits recognized in this actuarial valuation are prescribed by New York State statute (Article 11 of the Education Law and Articles 11, 14, 15, 18, 19, and 20 of the Retirement and Social Security Law), and are summarized in Appendix 17. All benefits are included in the actuarial valuation. The actuarial methods, calculations, and actuarial assumptions are in accordance with standards of practice prescribed by the Actuarial Standards Board and generally accepted actuarial principles and procedures. The assumptions used in determining the liabilities and costs are internally consistent and reasonably related to actual and anticipated future experience of the Retirement System. The undersigned meet the qualification standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.



Richard A. Young, ASA, EA, MAAA, FCA  
Actuary



Suzanne Warner, ASA, MAAA  
Manager, Office of the Actuary



Kati Buccinna, ASA, EA, MAAA  
Assistant Manager, Office of the Actuary



New York State Teachers' Retirement System  
Office of the Actuary  
July 10, 2014

APPENDIX 1

**RECONCILIATION OF THE ACTUARIAL VALUE OF ASSETS**

From June 30, 2012 to June 30, 2013

	Actuarial Value* <u>(in thousands)</u>
1. Actuarial Value of Assets as of June 30, 2012	\$82,681,854
2. Contributions and Transfers	
Employer contributions	1,580,551
Member contributions	126,681
Net transfers (in/out)	<u>4,523</u>
Subtotal	1,711,755
3. Net Investment Income/(Loss)	4,264,339
4. Distributions	
Benefit payments	6,105,326
Return of member contributions	<u>20,869</u>
Subtotal	6,126,195
5. Actuarial Value of Assets as of June 30, 2013 <sup>1</sup>	<u>\$82,531,752</u>
6. Market Value of Assets as of June 30, 2013	\$95,367,021

\*Totals may not add due to rounding.

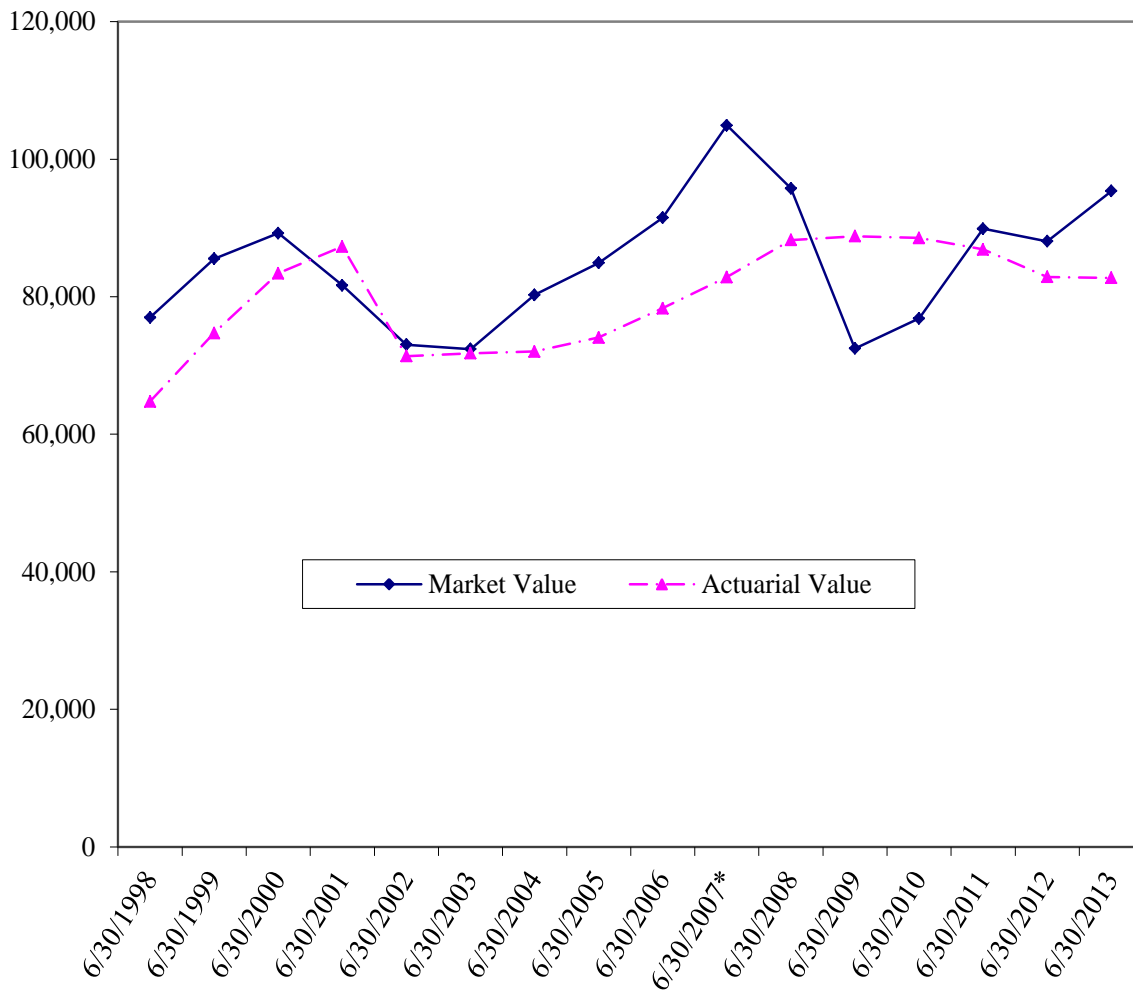
<sup>1</sup> Actuarial value of assets used in determining the Normal Rate, and excludes the net asset value of the Group Life Insurance Fund.

APPENDIX 2

**COMPARISON OF MARKET VALUE TO ACTUARIAL VALUE OF ASSETS**  
(in Millions)

Fiscal Year Ending	Market Value	Actuarial Value	Fiscal Year Ending	Market Value	Actuarial Value
6/30/1998	\$ 76,980.5	\$ 64,778.9	6/30/2006	\$ 91,492.2	\$ 78,335.8
6/30/1999	85,514.4	74,721.1	6/30/2007*	104,912.9	82,858.9
6/30/2000	89,247.3	83,421.8	6/30/2008	95,769.3	88,254.7
6/30/2001	81,664.2	87,295.3	6/30/2009	72,471.8	88,805.5
6/30/2002	73,041.2	71,374.4	6/30/2010	76,844.9	88,544.4
6/30/2003	72,391.5	71,780.4	6/30/2011	89,889.7	86,892.2
6/30/2004	80,276.2	72,044.4	6/30/2012	88,056.3	82,871.4
6/30/2005	84,908.5	74,074.3	6/30/2013	95,367.0	82,742.5

Market Value vs. Actuarial Value  
(in Millions)



\*Effective June 30, 2007, the Retirement System's asset valuation method was changed.

APPENDIX 3

**ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS**

as of June 30, 2013 and June 30, 2012  
(in Thousands)

Each year an actuarial valuation determines the actuarial present value of future benefits (PVB), which is the present value of retirement and ancillary benefit payments that the Retirement System can expect to pay in the future to current retirees and members. The PVB is based upon both service and salary projected to retirement. The results of the two most recent actuarial valuations are displayed in the following table.

	<b>2013</b>	<b>2012</b>
<b>Present Value of Benefits Currently Being Paid:</b>		
Service Retirement Benefits.....	\$51,807,853	\$50,434,852
Disability Retirement Benefits.....	286,285	279,173
Death Benefits.....	2,375	2,697
Survivor Benefits.....	733,317	686,872
Cost-of-Living Allowance.....	<u>4,665,647</u>	<u>4,634,175</u>
Total Present Value of Benefits Presently Being Paid	57,495,477	56,037,769
 <b>Present Value of Benefits Payable in the Future to Current Active Members:</b>		
Service Retirement Benefits.....	49,065,090	48,417,710
Disability Retirement Benefits.....	223,852	220,231
Termination Benefits.....	1,806,612	1,797,499
Death and Survivor Benefits.....	442,672	438,738
Cost-of-Living Allowance.....	<u>1,024,222</u>	<u>1,021,289</u>
Total Active Member Liabilities	52,562,450	51,895,466
 <b>Present Value of Benefits Payable in the Future to Current Inactive (Vested) Members:</b>		
Retirement Benefits.....	246,725	228,637
Death Benefits.....	331	291
Cost-of-Living Allowance.....	<u>5,150</u>	<u>4,823</u>
Total Vested Liabilities	252,206	233,751
 Unclaimed Funds.....	 11,057	 9,740
 <b>Total Actuarial Present Value of Future Benefits</b>	 <b>\$110,321,190</b>	 <b>\$108,176,726</b>

*Note: Totals may not sum due to rounding*



APPENDIX 4

**FUNDING PROGRESS**

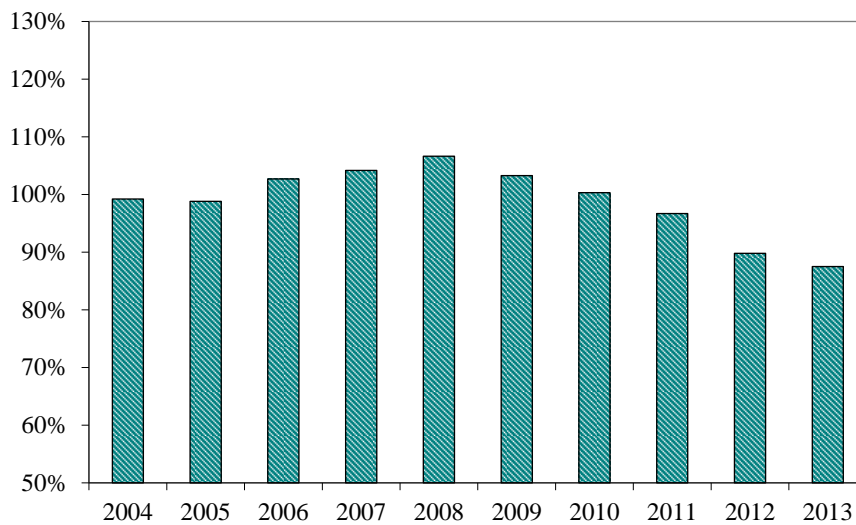
The portion of the actuarial present value of future benefits that is attributed to service rendered as of the valuation date is known as the actuarial accrued liability. In order to effectively assess the funding progress of a retirement system, it is necessary to compare the actuarial value of assets and the actuarial accrued liabilities over a period of time.

The Retirement System’s funding method has allowed the accumulation of assets appropriate for the funding of its liabilities in a systematic and reasonable manner.

**Analysis of Funding Progress  
(in Millions)**

<u>Fiscal Year Ending</u>	<u>Actuarial Value of Assets<sup>1</sup></u>	<u>Actuarial Accrued Liability<sup>2</sup></u>	<u>Percent Funded</u>
2004	\$72,044.4	\$72,604.9	99.2%
2005	74,074.3	74,961.1	98.8
2006	78,335.8	76,353.0	102.6
2007	82,858.9	79,537.2	104.2
2008	88,254.7	82,777.5	106.6
2009	88,805.5	86,062.0	103.2
2010	88,544.4	88,318.8	100.3
2011	86,892.2	89,824.9	96.7
2012	82,871.4	92,250.9	89.8
2013	82,742.5	94,583.8	87.5

**Percent Funded**



<sup>1</sup> Effective June 30, 2007, the Retirement System’s asset valuation method was changed.

<sup>2</sup> Effective June 30, 2006, the Actuarial Accrued Liability is calculated under the Entry Age Normal Cost Method as required by Governmental Accounting Standards Board (GASB) Statement No. 50 – *Pension Disclosures*. NYSTRS is funded in accordance with the Aggregate Cost Method. GASB now requires that the Entry Age Normal Cost Method be used to calculate the accrued liability for purposes of presenting the funded percentage.

APPENDIX 5

**EMPLOYER CONTRIBUTION RATE**

2013 Valuation

8.00% Interest

<b>Normal Rate</b>	17.13%
<b>Group Life Insurance Rate</b>	0.13
<b>Excess Benefit Plan Rate</b>	0.00
<b>Expense Rate</b>	0.27
<b>Computed Contribution Rate as of June 30, 2013</b>	<b>17.53%</b>

## APPENDIX 5 (Cont'd.)

**NORMAL RATE CALCULATION**

2013 Valuation

8.00% Interest

**Liabilities****Active Tier 1**

Service Pension	\$871,175,179
Disability Pension	0
Vested Pension	0
Active Death over \$50,000	9,730,677
Death Benefit After 10-Yr Withdrawal over \$50,000	0
Annuity Savings Fund	5,104,998
COLA	12,937,081
Total	\$898,947,935

**Active Tier 2**

Service Pension	\$1,193,537,237
Post Retired Death over \$50,000	1,079,891
Disability Pension	8,553
Post Disabled Death over \$50,000	199
Vested Pension	63,749
Active Death over \$50,000	4,019,044
Death Benefit After 10-Yr Withdrawal over \$50,000	12
COLA	21,303,908
Total	\$1,220,012,593

**Active Tier 3**

Service Pension	\$4,699,653,537
Post Retired Death over \$50,000	3,628,062
Disability Pension	1,237,970
Post Disabled Death over \$50,000	21,394
Refund on Active Death	3,656,432
Active Death over \$50,000	13,508,146
Refund on Quit	203,737
Vested Pension	7,952,183
Death Benefit After 10-Yr Withdrawal over \$50,000	1,413
Refund on Death after Vested Withdrawal	727
COLA	99,039,828
Total	\$4,828,903,429

APPENDIX 5 (Cont'd.)

**NORMAL RATE CALCULATION (Cont'd.)**

2013 Valuation  
8.00% Interest

**Liabilities (Cont'd.)**

**Active Tier 4**

Service Pension	\$41,295,737,010
Post Retired Death over \$50,000	67,742,433
Disability Pension	217,468,491
Post Disabled Death over \$50,000	6,440,151
Refund on Active Death	36,253,117
Active Death over \$50,000	276,609,850
Refund on Quit	136,687,020
Vested Pension	1,594,833,844
Death Benefit After 10-Yr Withdrawal over \$50,000	2,938,863
Refund on Death after Vested Withdrawal	1,375,926
COLA	869,638,522
Total	\$44,505,725,227

**Active Tier 5**

Service Pension	\$494,862,407
Post Retired Death over \$50,000	1,265,718
Disability Pension	4,006,882
Post Disabled Death over \$50,000	124,047
Refund on Active Death	1,921,584
Active Death over \$50,000	5,642,725
Refund on Quit	24,039,295
Vested Pension	24,665,995
Death Benefit After 10-Yr Withdrawal over \$50,000	77,913
Refund on Death after Vested Withdrawal	64,140
COLA	10,221,743
Total	\$566,892,449

**Active Tier 6**

Service Pension	\$123,163,132
Post Retired Death over \$50,000	324,316
Disability Pension	1,096,791
Post Disabled Death over \$50,000	31,906
Refund on Active Death	920,504
Active Death over \$50,000	1,803,627
Refund on Quit	7,213,811
Vested Pension	5,246,186
Death Benefit After 10-Yr Withdrawal over \$50,000	18,888
Refund on Death after Vested Withdrawal	21,412
COLA	2,933,517
Total	\$142,774,090

APPENDIX 5 (Cont'd.)

**NORMAL RATE CALCULATION (Cont'd.)**

2013 Valuation  
8.00% Interest

**Liabilities (Cont'd.)**

**Retirees**

Retired Pension	\$51,668,040,097
Retired Annuity	139,813,012
Disability Pension	285,506,711
Disability Annuity	778,366
Beneficiary Pension	718,903,991
Beneficiary Annuity	8,476,686
DBA Pension	5,527,307
DBA Annuity	409,158
Escalation	4,702,686
Post Retired Death over \$50,000	1,722,436
COLA	4,103,814,037
Catch-Up & Prior §532 Supp	557,129,845
Total	\$57,494,824,332

**Vesteds**

Inactive Vested	\$246,724,844
Death Benefit After 10-Yr Withdrawal over \$50,000	330,958
Active Vested	378,411,943
Death Benefit After 10-Yr Withdrawal over \$50,000	1,164,884
COLA	13,048,686
Total	\$639,681,315

**TIAA**

Service Pension	\$3,445,000
Disability Pension	33,758
Vested Pension	42,500
Active Death over \$50,000	8,034
COLA	249,069
Total	\$3,778,361

**Miscellaneous**

Incurred Death but not Paid	\$8,593,133
Unclaimed Non-Member Funds	11,057,108
Total	\$19,650,241

<b>Total Liabilities</b>	\$110,321,189,972
--------------------------	-------------------

APPENDIX 5 (Cont'd.)

**NORMAL RATE CALCULATION (Cont'd.)**

2013 Valuation  
8.00% Interest

**Assets for Valuation**

Current Total Assets		\$93,531,255,172
Less:	Expense Fund	<u>55,581,264</u>
	Sub-total	\$93,475,673,908
Less:	5 Year Smoothing Adjustment	<u>10,733,157,466</u>
	<b>Assets for Valuation Purposes</b>	\$82,742,516,442
Less:	Group Life Insurance Fund Net Asset Value	<u>210,763,990</u>
	<b>Assets for Normal Rate Valuation Purposes</b>	\$82,531,752,452

**Receivables**

Assets receivable from Normal Rate in 2013-2014 fiscal year (2012-2013 paybase)(2011 Normal Rate)(1.08) <sup>-7/24</sup> (14,647,829,530)(0.1144)( 1.08) <sup>-7/24</sup>		\$1,638,516,074
Assets receivable from Normal Rate in 2014-2015 fiscal year (2013-2014 paybase)(2012 Normal Rate)(1.08) <sup>-1 7/24</sup> (14,794,000,000)(0.1585)( 1.08) <sup>-1 7/24</sup>		\$2,122,963,513
Assets receivable from the amortization of Article 18		\$0
Present Value of Future Member Contributions		
(Tier 4 Present Value of Future Employee Contributions)(1.08) <sup>-7/24</sup> (281,350,169)(1.08) <sup>-7/24</sup>		\$275,105,064
(Tier 5 Present Value of Future Employee Contributions)(1.08) <sup>-7/24</sup> (182,122,897)(1.08) <sup>-7/24</sup>		\$178,080,331
(Tier 6 Present Value of Future Employee Contributions)(1.08) <sup>-7/24</sup> (78,346,069)(1.08) <sup>-7/24</sup>		\$76,607,028
Assets receivable from Retirement Incentive Payments Chapter 105 of the Laws of 2010		
Receivable in 2013-2014 (10,521,611)(1.08) <sup>-7/24</sup>		\$10,288,064
Receivable in 2014-2015 (10,559,282) (1.08) <sup>-1 7/24</sup>		\$9,560,091
Receivable in 2015-2016 (10,559,282) (1.08) <sup>-2 7/24</sup>		<u>\$8,851,936</u>
	<b>Total Receivables</b>	\$4,319,972,101

APPENDIX 5 (Cont'd.)

**NORMAL RATE CALCULATION (Cont'd.)**

2013 Valuation

8.00% Interest

**Present Value of Future Salaries**

	<u>Total PVFS</u>	
Tier 1	\$417,577,665	
Tier 2	606,499,306	
Tier 3	2,690,337,010	
Tier 4	130,319,042,165	
Tier 5	4,550,427,077	
Tier 6	1,529,343,697	
	\$140,113,226,920	
		$\times (1.08)^{-7/24} =$
		\$137,003,146,007

**Normal Rate**

$$\frac{\text{Total Liabilities - (Assets + Receivables)}}{\text{Present Value of Future Salaries}} = 17.1306\%$$

$$\frac{\$23,469,465,419}{\$137,003,146,007} = 17.13\% \text{ (rounded)}$$

APPENDIX 5 (Cont'd.)

**GROUP LIFE INSURANCE FUND**

2013 Valuation

8.00% Interest

**A) Calculation of June 30, 2013 Balance**

Actuarial Value as of July 1, 2012		\$242,312,872
Interest	[ 242,312,872 x .08 ]	\$19,385,030
October 15, 2012 actual premium	\$19,027,813	
October 15, 2012 deferred premium	<u>(\$19,908,200)</u>	
Premium Gain/(Loss)		(\$880,387)
Interest	[ (880,387) x (1.08 <sup>8.5/12</sup> - 1) ]	(\$49,326)
Death Benefits paid in 2012-2013		(\$13,523,364)
Interest	[ (13,523,364) x (1.08 <sup>-5</sup> - 1) ]	(\$530,528)
October 15, 2015 deferred premium [from B]		\$19,444,100
Interest discount	[ 19,444,100 x (1.08 <sup>-(2 + 3.5/12)</sup> - 1) ]	<u>(\$3,143,945)</u>
<b>Actuarial Value as of June 30, 2013</b>		<b>\$263,014,452</b>

**B) Calculation of Required Premium, GLIF Rate and Deferred Premium**

Death benefits	[ 13,523,364 x 1.08 <sup>2+9.5/12</sup> ]	\$16,764,582
Interest	[ (19,385,030) x 1.08 <sup>2+3.5/12</sup> ]	(\$23,123,980)
Premium Loss/(Gain)	[ 880,387 x 1.08 <sup>3</sup> ]	\$1,109,034
Adjustment to the GLIF reserve		<u>\$24,694,464</u>
Total required premium		\$19,444,100

$$\begin{aligned} \text{GLIF Rate} &= \frac{\text{Required premium}}{\text{Estimated 2014-2015 paybase}} \\ &= \frac{\$19,444,100}{\$14,957,000,000} \\ &= 0.13\% \end{aligned}$$

$$\text{October 15, 2015 deferred premium} \quad [ 14,957,000,000 \times 0.0013 ] = \$19,444,100$$

**C) Summary of Deferred Premiums**

	<u>Deferred Premium</u>	<u>Present Value as of 6/30/2013</u>
Due October 15, 2013	\$19,441,500	\$19,009,959
Due October 15, 2014	\$18,710,900	\$16,940,348
Due October 15, 2015	\$19,444,100	<u>\$16,300,155</u>
		\$52,250,462

**D) GLIF Net Asset Value (A - C)**

$$\$263,014,452 - \$52,250,462 = \$210,763,990$$



APPENDIX 5 (Cont'd.)

**EXCESS BENEFIT PLAN FUND\***  
2013 Valuation

<b>Balance as of July 1, 2013 (Cash Basis)</b>	\$3,797,561
<b>less</b> Final Adjustment for the 2013 Fiscal Year	\$262,239
<b>plus</b> Employer contribution (paid 10/15/2013) [ 0.0000 X \$14,647,829,530 (6/30/2011 Excess Benefit Plan rate of 0.00% times 2012 - 2013 paybase) ]	\$0
<b>less</b> Annual Estimated Payments	<u>\$600,000</u>
<b>Expected Balance as of June 30, 2014</b>	<b>\$2,935,322</b>
<b>plus</b> Employer contribution (payable 10/15/2014) [ 0.0000 X \$14,794,000,000 (6/30/2012 Excess Benefit Plan rate of 0.00% times est'd. 2013 - 2014 paybase) ]	\$0
<b>less</b> Annual Estimated Payments	<u>\$600,000</u>
<b>Expected Balance as of June 30, 2015</b>	<b>\$2,335,322</b>

\* Fund is in a zero-interest checking account

APPENDIX 5 (Cont'd.)

The Administrative Rate and Employer Contributions<sup>1</sup>

The administrative portion (Rate) of the employer contribution rate is adopted annually by the Retirement Board in the amount necessary to defray Retirement Administration related expenses for the following fiscal year. The first step in determining the rate is to divide the projected Retirement Administration related expenses by the projected member salary base. Consideration is also given to the overall status of the fund balance.

There will be no change to the Rate in 2015-16 and it is anticipated to be sustained for the next three to five years at 0.27% of member salary base.

**Employer Contributions to the Administrative Fund**

Member Salary Base		Rate (%)	Employer Contributions (Net of Billing Adjustments)		Increase/Decrease in Contributions to the Administrative Fund
Year	Amount		Year Collected	Amount	Percent
2015-16	\$15,137,000,000 *	<b>0.27</b> *	2016-17	\$40,870,000 *	1.20% *
2014-15	14,957,000,000 *	<b>0.27</b>	2015-16	40,384,000 *	1.10% *
2013-14	14,794,000,000 *	<b>0.27</b>	2014-15	39,944,000 *	1.00% *
2012-13	14,647,830,000	<b>0.27</b>	2013-14	39,549,000 *	0.05%
2011-12	14,640,764,000	<b>0.27</b>	2012-13	39,530,000	(0.68%)
2010-11	14,732,895,000	<b>0.27</b>	2011-12	39,802,000	(15.98%)
2009-10	14,792,116,000	<b>0.32</b>	2010-11	47,373,000	2.99%

\*Estimated.

Estimated Member Salary Base

The member salary base is actuarially determined; it increases as new members join the System and as members receive pay increases from their employers. Annual retirements and other forms of separation from service mitigate this increase. The member salary base is projected to increase 1.1% on average per year from 2014 through 2016.

The Proposed Administrative Rate Calculation (2015 – 16)

Several factors are considered when anticipating expenses used in calculating the administrative rate, which include general price increases, an estimated 10% increase in ERS and capital asset additions.

$$\frac{\text{Projected 2015-16 Administrative Expenses}}{\text{Estimated 2014-15 Member Salary Base}} = \frac{\$43,438,922}{\$14,957,000,000} = 0.29\%$$

$$\text{Proposed Administrative Rate for 2015-16 Collections:} = 0.27\%$$

<sup>1</sup> From the NYSTRS 2013-14 Operating Budget Report.

APPENDIX 5 (Cont'd.)

**ASSET VALUATION METHOD  
DEVELOPMENT OF SMOOTHING ADJUSTMENT**

<u>FYE</u>	<u>Market Value</u>	<u>Contributions</u>	<u>Benefit Payments</u>	<u>Average Market Value<sup>1</sup></u>
6/30/2008	94,458,424,385	1,306,481,575	4,980,254,119	
6/30/2009	71,249,898,676	1,357,000,550	5,217,944,754	92,810,660,731
6/30/2010	75,829,228,763	1,260,000,256	5,399,946,740	69,442,425,487
6/30/2011	88,414,049,393	1,072,744,659	5,751,514,083	73,713,332,522
6/30/2012	86,303,987,073	1,479,186,529	5,979,984,123	86,471,814,456
6/30/2013	93,531,255,172	1,765,812,556	6,194,057,011	84,457,742,461

<u>FYE</u>	<u>Actual Gain<sup>2</sup></u>	<u>3.0% Expected Gain<sup>3</sup></u>	<u>Unexpected Gain<sup>4</sup></u>	<u>Smoothing Adjustment<sup>5</sup></u>
6/30/2008	(7,781,949,313)			
6/30/2009	(21,516,277,258)	2,784,319,822	(24,300,597,080)	
6/30/2010	6,776,647,973	2,083,272,765	4,693,375,208	
6/30/2011	15,395,104,554	2,211,399,976	13,183,704,578	
6/30/2012	659,956,804	2,594,154,434	(1,934,197,630)	
6/30/2013	9,635,631,237	2,533,732,274	7,101,898,963	<b>10,733,157,466</b>

<sup>1</sup> Average Market Value = Market Value<sub>(previous yr)</sub> - (.5 x Benefit Payments) + ((8.5/12) x Contributions)

<sup>2</sup> Actual Gain = Net Appreciation (Realized and Unrealized)

<sup>3</sup> Expected Gain = 3.0% x Average Market Value

<sup>4</sup> Unexpected Gain = Actual Gain - Expected Gain

<sup>5</sup> Smoothing Adjustment = (.20 x Unexpected Gain 6/30/2010)  
+ (.40 x Unexpected Gain 6/30/2011)  
+ (.60 x Unexpected Gain 6/30/2012)  
+ (.80 x Unexpected Gain 6/30/2013)

APPENDIX 6

**MEMBER RECONCILIATION**

**ACTIVE MEMBERS:**

	<u>Male</u>	<u>Female</u>	<u>Total</u>
June 30, 2012.....	66,156	211,117	<b>277,273</b>
Changes During Year:			
Added.....	1,863	6,215	<b>8,078</b>
Withdrawn.....	1,427	4,096	<b>5,523</b>
Retired.....	1,425	4,905	<b>6,330</b>
Died.....	57	113	<b>170</b>
June 30, 2013.....	65,110	208,218	<b>273,328</b>

**MEMBERS RETIRED FOR:**

	<u>Service*</u>			<u>Disability</u>			<u>Total</u>		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2012.....	50,177	92,186	142,363	517	1,558	2,075	<b>50,694</b>	<b>93,744</b>	<b>144,438</b>
Changes During Year:									
Retired.....	1,393	4,809	6,202	32	96	128	<b>1,425</b>	<b>4,905</b>	<b>6,330</b>
Died.....	1,254	1,910	3,164	35	80	115	<b>1,289</b>	<b>1,990</b>	<b>3,279</b>
Lump Sum.....	37	160	197	0	0	0	<b>37</b>	<b>160</b>	<b>197</b>
Restored to Active Membership....	0	0	0	1	0	1	<b>1</b>	<b>0</b>	<b>1</b>
June 30, 2013.....	50,279	94,925	145,204	513	1,574	2,087 **	<b>50,792</b>	<b>96,499</b>	<b>147,291</b>

**BENEFICIARIES OF DECEASED:**

	<u>Service Annuitants</u>			<u>Disability Annuitants</u>			<u>Active Members</u>			<u>Total</u>		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
June 30, 2012.....	1,057	3,887	4,944	87	165	252	30	148	178	<b>1,174</b>	<b>4,200</b>	<b>5,374</b>
Changes During Year:												
Added.....	134	299	433	6	7	13	0	0	0	<b>140</b>	<b>306</b>	<b>446</b>
Died.....	73	202	275	2	3	5	1	8	9	<b>76</b>	<b>213</b>	<b>289</b>
June 30, 2013.....	1,118	3,984	5,102	91	169	260	29	140	169	<b>1,238</b>	<b>4,293</b>	<b>5,531</b>

**SUMMARY:**

	<u>Male</u>	<u>Female</u>	<u>Total</u>
Active Members.....	65,110	208,218	<b>273,328</b>
Retired Members.....	50,792	96,499	<b>147,291</b>
Beneficiaries.....	1,238	4,293	<b>5,531</b>
Total.....	117,140	309,010	<b>426,150</b>

\*Also includes vested retirees.

\*\*Includes 35 males and 38 females retired for disability who receive a service benefit.

APPENDIX 7

**DISTRIBUTION OF ACTIVE MEMBERS**

Distribution by Age as of June 30, 2013

<u>Age</u>	<u>Male</u>	<u>Female</u>	<u>Total Members</u>
15-19	12	19	31
20-24	1,423	4,800	6,223
25-29	7,030	22,329	29,359
30-34	9,541	28,808	38,349
35-39	10,199	28,232	38,431
40-44	10,293	29,717	40,010
45-49	8,525	27,173	35,698
50-54	7,299	27,240	34,539
55-59	5,842	22,478	28,320
60-64	3,484	13,623	17,107
65-69	1,077	2,985	4,062
70-74	256	614	870
75-79	85	153	238
80-84	36	37	73
85 or older	<u>8</u>	<u>10</u>	<u>18</u>
Total	65,110	208,218	273,328

*Average Male age is 42 years 6 months*

*Average Female age is 43 years 3 months*

APPENDIX 7 (Cont'd.)

Distribution of Active Members by Age and New York State Service as of June 30, 2013

<b>Male</b>			
<u>Age</u>	<u>Less Than 10 Years New York State Service</u>	<u>10 or More Years New York State Service</u>	<u>Total New York State Service</u>
15-19	12	0	12
20-24	1,423	0	1,423
25-29	7,029	1	7,030
30-34	8,269	1,272	9,541
35-39	4,470	5,729	10,199
40-44	2,897	7,396	10,293
45-49	2,167	6,358	8,525
50-54	1,731	5,568	7,299
55-59	1,404	4,438	5,842
60-64	918	2,566	3,484
65-69	432	645	1,077
70-74	140	116	256
75-79	50	35	85
80-84	22	14	36
85 or older	4	4	8
Total	30,968	34,142	65,110

<b>Female</b>			
<u>Age</u>	<u>Less Than 10 Years New York State Service</u>	<u>10 or More Years New York State Service</u>	<u>Total New York State Service</u>
15-19	19	0	19
20-24	4,800	0	4,800
25-29	22,329	0	22,329
30-34	25,093	3,715	28,808
35-39	13,651	14,581	28,232
40-44	11,384	18,333	29,717
45-49	10,161	17,012	27,173
50-54	8,597	18,643	27,240
55-59	5,184	17,294	22,478
60-64	2,566	11,057	13,623
65-69	742	2,243	2,985
70-74	202	412	614
75-79	69	84	153
80-84	17	20	37
85 or older	3	7	10
Total	104,817	103,401	208,218

APPENDIX 7 (Cont'd.)

Distribution of Active Members by Total Service as of June 30, 2013

<u>Years of Service</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
0-4	18,252	57,879	76,131
5-9	12,118	44,006	56,124
10-14	13,101	42,251	55,352
15-19	9,503	27,184	36,687
20-24	5,224	17,026	22,250
25-29	4,036	13,269	17,305
30-34	1,924	5,097	7,021
35 or more	<u>952</u>	<u>1,506</u>	<u>2,458</u>
Total	65,110	208,218	273,328

*Average Male has 11 Years of Total Service*

*Average Female has 11 Years of Total Service*

APPENDIX 8

**HISTORICAL MEMBER STATISTICS**

**Active Members and Annuitants 1925-2013**

<u>As of June 30</u>	<u>Active Members</u>	<u>Retirees &amp; Beneficiaries</u>
1925	29,057	1,815
1930	39,663	2,732
1935	45,031	3,919
1940	48,193	4,771
1945	52,359	5,637
1950	56,504	6,374
1955	71,273	7,897
1960	99,555	10,796
1965	129,543	16,043
1970	186,914	22,700
1975	227,038	35,252
1980	203,330	46,812
1985	178,516	57,366
1990	195,194	69,127
1995	199,398	82,459
2000	224,986	100,839
2005	260,356	125,325
2010	285,774	141,716
2013	273,328	152,822

**Number of Active Members by Tier**

<u>As of June 30</u>	<u>Tier 1</u>	<u>Tier 2</u>	<u>Tier 3</u>	<u>Tier 4</u>	<u>Tier 5</u>	<u>Tier 6</u>	<u>Total</u>
1994	67,423	17,212	26,121	84,935	--	--	195,691
1995	64,093	17,012	25,206	93,087	--	--	199,398
1996	58,850	16,596	24,546	100,926	--	--	200,918
1997	53,502	16,186	23,861	110,167	--	--	203,716
1998	49,266	15,860	23,302	120,652	--	--	209,080
1999	50,859	15,776	20,726	128,906	--	--	216,267
2000	47,234	15,700	20,159	141,893	--	--	224,986
2001	41,169	15,472	19,914	157,795	--	--	234,350
2002	35,601	15,121	19,674	172,438	--	--	242,834
2003	28,327	14,463	19,083	185,374	--	--	247,247
2004	22,986	13,947	18,835	198,747	--	--	254,515
2005	17,901	13,210	18,535	210,710	--	--	260,356
2006	13,621	12,084	18,173	220,532	--	--	264,410
2007	10,838	10,178	17,743	231,286	--	--	270,045
2008	8,630	8,171	17,007	241,093	--	--	274,901
2009	6,943	6,752	16,111	250,532	--	--	280,338
2010	5,582	5,706	14,942	255,966	3,578	--	285,774
2011	3,814	4,137	12,690	247,530	12,264	--	280,435
2012	2,756	3,253	11,180	239,199	19,969	916	277,273
2013	1,968	2,447	9,450	231,258	19,452	8,753	273,328



APPENDIX 9

RETIREMENT STATISTICS

**RETIREMENT STATISTICS 2012-13 MEMBERS RETIRED FOR:**

	<b>Service*</b>	<b>Disability</b>
Number Retired.....	<b>6,203</b>	<b>127</b>
Age at Retirement:		
Average.....	60 yrs., 10 mos.	51 yrs., 1 mo.
Median.....	60 yrs., 10 mos.	51 yrs., 9 mos.
Years of Service:		
Average.....	25 yrs., 6 mos.	17 yrs., 6 mos.
Median.....	27 yrs., 0 mos.	16 yrs., 2 mos.
**Benefit:		
Average.....	\$44,768	\$25,468
Median.....	\$45,099	\$24,394
Final Average Salary (FAS):		
Average.....	\$81,987	\$72,586
Median.....	\$81,874	\$67,764
***Benefit as % of FAS:		
Average.....	48.26%	34.42%
Median.....	52.67%	33.33%

**2012-13 MEMBERS RETIRED FOR SERVICE\* WITH:**

	<b>Less Than 20 Yrs. N.Y.</b>	<b>Between 20 Yrs. N.Y. and 35 Yrs. Total</b>	<b>35 Yrs. Total or More</b>
Number Retired.....	<b>1,558</b>	<b>3,703</b>	<b>942</b>
Age at Retirement:			
Average.....	60 yrs., 10 mos.	60 yrs., 5 mos.	62 yrs., 1 mo.
Median.....	61 yrs., 0 mos.	60 yrs., 7 mos.	61 yrs., 5 mos.
Years of Service:			
Average.....	11 yrs., 7 mos.	28 yrs., 1 mo.	39 yrs., 2 mos.
Median.....	11 yrs., 5 mos.	29 yrs., 4 mos.	39 yrs., 0 mos.
**Benefit:			
Average.....	\$8,610	\$50,009	\$83,970
Median.....	\$5,945	\$49,548	\$77,567
Final Average Salary (FAS):			
Average.....	\$45,399	\$90,264	\$109,965
Median.....	\$38,611	\$88,089	\$101,294
***Benefit as % of FAS:			
Average.....	17.28%	54.22%	76.06%
Median.....	16.67%	58.00%	78.00%

\*Also includes vested retirees.

\*\*The Maximum, even though the member may have chosen an option.

\*\*\*The average and median of individual benefits as percentages of final average salary.

APPENDIX 9 (Cont'd.)

**RETIREMENT STATISTICS ALL RETIREES AS OF JUNE 30, 2013 RETIRED FOR:**

	<b>Service*</b>	<b>Disability</b>
Number Retired.....	<b>145,277</b>	<b>2,014</b>
Age at Retirement:		
Average.....	58 yrs., 5 mos.	49 yrs., 6 mos.
Median.....	57 yrs., 3 mos.	50 yrs., 3 mos.
Years of Service:		
Average.....	28 yrs., 4 mos.	18 yrs., 8 mos.
Median.....	30 yrs., 5 mos.	18 yrs., 2 mos.
**Benefit:		
Average.....	\$39,534	\$18,858
Median.....	\$39,296	\$17,100
Final Average Salary (FAS):		
Average.....	\$66,245	\$51,126
Median.....	\$65,768	\$49,967
***Benefit as % of FAS:		
Average.....	55.10%	36.03%
Median.....	60.83%	33.33%

**ALL RETIREES AS OF JUNE 30, 2013 RETIRED FOR SERVICE\* WITH:**

	<b>Less Than 20 Yrs. N.Y.</b>	<b>Between 20 Yrs. N.Y. and 35 Yrs. Total</b>	<b>35 Yrs. Total or More</b>
Number Retired.....	<b>24,082</b>	<b>85,926</b>	<b>35,269</b>
Age at Retirement:			
Average.....	58 yrs., 8 mos.	58 yrs., 2 mos.	58 yrs., 9 mos.
Median.....	57 yrs., 0 mos.	56 yrs., 10 mos.	58 yrs., 2 mos.
Years of Service:			
Average.....	13 yrs., 8 mos.	28 yrs., 7 mos.	37 yrs., 4 mos.
Median.....	14 yrs., 0 mos.	30 yrs., 0 mos.	36 yrs., 8 mos.
**Benefit:			
Average.....	\$7,772	\$38,782	\$63,057
Median.....	\$5,845	\$37,871	\$59,592
Final Average Salary (FAS):			
Average.....	\$36,022	\$67,143	\$84,693
Median.....	\$29,418	\$65,669	\$80,686
***Benefit as % of FAS:			
Average.....	21.23%	56.76%	74.21%
Median.....	19.91%	59.70%	73.56%

\*Also includes vested retirees.

\*\*The Maximum, even though the member may have chosen an option.

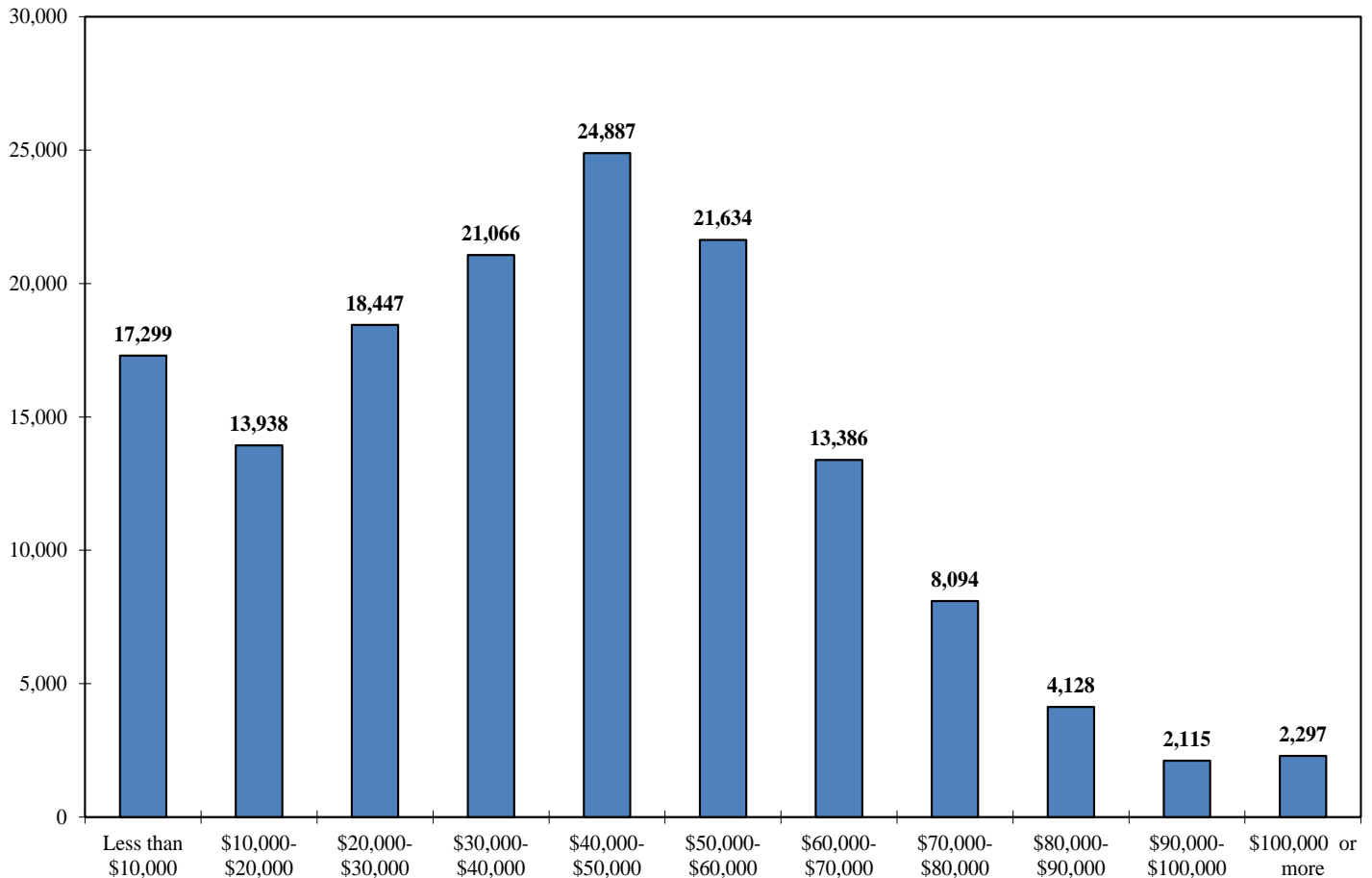
\*\*\*The average and median of individual benefits as percentages of final average salary.

APPENDIX 9 (Cont'd.)

**Retired Members' Characteristics<sup>1</sup>  
By Year of Retirement**

<u>Retired in Fiscal Year Ended</u>	<u>Number of Retired Members</u>	<u>Average Age at Retirement (yrs.- mos.)</u>	<u>Average Service at Retirement (yrs.- mos.)</u>	<u>Average Final Average Salary</u>	<u>Average Maximum Annual Benefit</u>
2004	7,287	57-7	28-8	\$72,799	\$45,063
2005	7,182	57-10	28-6	72,126	45,394
2006	7,281	58-4	28-2	71,840	43,914
2007	6,900	58-7	28-1	74,185	44,204
2008	6,330	58-11	27-8	77,066	45,779
2009	5,644	59-6	27-7	78,050	46,061
2010	5,501	60-0	27-5	79,615	46,489
2011	8,423	60-3	28-7	85,010	51,200
2012	6,033	60-9	26-3	82,461	45,759
2013	6,330	60-10	25-6	81,987	44,768

**Distribution of the Annual Benefit<sup>2</sup> of All Retired Members**



<sup>1</sup> Averages are for service and vested retirees.

<sup>2</sup> Maximum annual retirement benefit as of June 30, 2013 including supplementation and COLA.

APPENDIX 10

2009 – 2013 EXPERIENCE STUDY  
 NUMBER OF SERVICE RETIREMENTS  
 TIER 1 AND TIERS 2, 3, 4 AT LEAST AGE 62 OR WITH 30 YEARS OF SERVICE  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

AGE	EXPOSURES	MALE			FEMALE			RATIO OF ACTUAL TO EXPECTED
		ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	EXPOSURES	ACTUAL	EXPECTED	
50	7	0	0.00	N/A	20	0	0.00	N/A
51	33	0	0.00	N/A	67	0	0.00	N/A
52	288	0	0.00	N/A	581	0	0.00	N/A
53	770	0	0.00	N/A	1,646	4	0.00	N/A
54	1,320	57	0.00	N/A	2,852	88	0.00	N/A
55	1,829	551	570.20	0.966	4,013	1,286	1,251.15	1.028
56	1,878	505	477.43	1.058	3,861	1,088	963.70	1.129
57	1,947	411	364.13	1.129	3,874	886	634.12	1.397
58	2,015	494	405.48	1.218	4,311	1,020	746.14	1.367
59	1,976	531	430.72	1.233	4,467	1,104	791.44	1.395
60	1,784	520	402.35	1.292	4,342	1,117	827.49	1.350
61	1,582	474	360.47	1.315	4,066	1,083	832.19	1.301
62	3,112	792	657.83	1.204	11,016	2,718	2,445.18	1.112
63	2,212	508	393.92	1.290	7,473	1,689	1,358.97	1.243
64	1,592	305	214.53	1.422	5,161	1,065	824.98	1.291
65	1,186	265	206.69	1.282	3,701	861	742.27	1.160
66	801	161	158.51	1.016	2,607	650	494.83	1.314
67	582	115	67.25	1.710	1,805	405	291.59	1.389
68	415	75	52.46	1.430	1,334	265	226.22	1.171
69	298	49	28.36	1.728	997	219	157.41	1.391
70	225	42	30.22	1.390	703	160	118.88	1.346
71	178	21	23.65	0.888	478	98	82.87	1.183
72	143	25	11.94	2.094	342	48	42.39	1.132
73	112	15	6.82	2.199	283	47	35.72	1.316
74	87	16	12.22	1.309	218	36	25.89	1.390
75	68	7	11.25	0.622	168	34	25.78	1.319
76	259	34	259.00	0.131	511	97	511.00	0.190
TOTAL	26,699	5,973	5,145.43	1.161	70,897	16,068	13,430.21	1.196

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF SERVICE RETIREMENTS  
 TIERS 2,3,4 LESS THAN AGE 62 AND WITH LESS THAN 30 YEARS OF SERVICE  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

AGE	MALE				FEMALE			
	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
50	6,176	1	0.00	N/A	22,994	1	0.00	N/A
51	6,085	2	0.00	N/A	23,068	3	0.00	N/A
52	5,827	2	0.00	N/A	22,475	4	0.00	N/A
53	5,399	2	0.00	N/A	21,444	6	0.00	N/A
54	5,060	31	0.00	N/A	20,717	108	0.00	N/A
55	4,616	151	159.84	0.945	20,215	724	852.73	0.849
56	4,225	148	126.72	1.168	19,098	708	703.47	1.006
57	3,892	135	112.17	1.204	18,051	726	634.78	1.144
58	3,519	164	133.48	1.229	16,422	783	657.26	1.191
59	3,093	165	106.90	1.543	14,250	795	602.29	1.320
60	2,675	157	126.13	1.245	11,951	773	579.50	1.334
61	2,307	175	123.11	1.421	9,719	801	609.86	1.313
<b>TOTAL</b>	<b>52,874</b>	<b>1,133</b>	<b>888.35</b>	<b>1.275</b>	<b>220,404</b>	<b>5,432</b>	<b>4,639.89</b>	<b>1.171</b>

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF SERVICE RETIREMENTS  
 TIER 5 LESS THAN AGE 62 AND WITH LESS THAN 30 YEARS OF SERVICE  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

AGE	MALE				FEMALE			
	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
50	55	0	0.00	N/A	220	0	0.00	N/A
51	57	0	0.00	N/A	217	0	0.00	N/A
52	57	0	0.00	N/A	206	0	0.00	N/A
53	45	0	0.00	N/A	185	0	0.00	N/A
54	57	0	0.00	N/A	187	0	0.00	N/A
55	54	0	0.93	0.000	155	0	3.27	0.000
56	63	0	0.94	0.000	106	0	1.95	0.000
57	50	0	0.72	0.000	126	0	2.22	0.000
58	48	0	0.91	0.000	100	0	2.00	0.000
59	48	0	0.83	0.000	87	0	1.84	0.000
60	34	0	0.80	0.000	81	0	1.96	0.000
61	34	0	0.91	0.000	54	0	1.69	0.000
TOTAL	602	0	6.04	0.000	1,724	0	14.93	0.000

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF SERVICE RETIREMENTS  
 TIER 5 AGE 62 OR GREATER  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

AGE	MALE				FEMALE			
	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	EXPOSURES	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
62	35	0	7.40	0.000	39	0	8.66	0.000
63	19	0	3.38	0.000	30	0	5.46	0.000
64	15	0	2.02	0.000	20	0	3.20	0.000
65	12	0	2.09	0.000	22	0	4.41	0.000
66	7	0	1.39	0.000	16	0	3.04	0.000
67	9	0	1.04	0.000	14	0	2.26	0.000
68	4	0	0.51	0.000	14	0	2.37	0.000
69	3	0	0.29	0.000	10	0	1.58	0.000
70	5	0	0.67	0.000	8	0	1.35	0.000
71	2	0	0.27	0.000	3	0	0.52	0.000
72	3	0	0.25	0.000	1	0	0.12	0.000
73	2	0	0.12	0.000	0	0	0.00	0.000
74	1	0	0.14	0.000	1	0	0.12	0.000
75	1	0	0.17	0.000	2	0	0.31	0.000
76	4	0	4.00	0.000	3	0	3.00	0.000
TOTAL	122	0	23.74	0.000	183	0	36.40	0.000

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF SERVICE RETIREMENTS  
 TIER 6  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

AGE	EXPOSURES	MALE			FEMALE			RATIO OF ACTUAL TO EXPECTED
		ACTUAL	EXPECTED	EXPECTED	EXPOSURES	ACTUAL	EXPECTED	
50	2	0	0.00	N/A	3	0	0.00	N/A
51	3	0	0.00	N/A	5	0	0.00	N/A
52	1	0	0.00	N/A	12	0	0.00	N/A
53	1	0	0.00	N/A	7	0	0.00	N/A
54	0	0	0.00	N/A	4	0	0.00	N/A
55	1	0	0.02	0.000	3	0	0.06	0.000
56	1	0	0.01	0.000	7	0	0.13	0.000
57	1	0	0.01	0.000	5	0	0.09	0.000
58	1	0	0.02	0.000	4	0	0.08	0.000
59	1	0	0.02	0.000	6	0	0.13	0.000
60	0	0	0.00	N/A	1	0	0.02	0.000
61	0	0	0.00	N/A	0	0	0.00	N/A
62	1	0	0.03	0.000	3	0	0.09	0.000
63	0	0	0.00	N/A	0	0	0.00	N/A
64	0	0	0.00	N/A	1	0	0.25	0.000
65	0	0	0.00	N/A	0	0	0.00	N/A
66	0	0	0.00	N/A	0	0	0.00	N/A
67	1	0	0.22	0.000	0	0	0.00	N/A
68	1	0	0.23	0.000	1	0	0.19	0.000
69	0	0	0.00	N/A	0	0	0.00	N/A
70	0	0	0.00	N/A	0	0	0.00	0.000
71	0	0	0.00	N/A	0	0	0.00	N/A
72	0	0	0.00	N/A	0	0	0.00	N/A
73	0	0	0.00	N/A	0	0	0.00	N/A
74	0	0	0.00	N/A	0	0	0.00	N/A
75	0	0	0.00	N/A	0	0	0.00	N/A
76	1	0	1.00	0.000	0	0	0.00	N/A
<b>TOTAL</b>	<b>16</b>	<b>0</b>	<b>1.56</b>	<b>0.000</b>	<b>62</b>	<b>0</b>	<b>1.04</b>	<b>0.000</b>



APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF DEATHS AMONG ACTIVE MEMBERS  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
20	0	0.15	0.000	1	0.29	3.448
25	8	3.56	2.247	5	7.14	0.700
30	12	8.02	1.496	22	15.44	1.425
35	14	12.81	1.093	19	21.47	0.885
40	14	17.61	0.795	27	30.98	0.872
45	25	21.92	1.141	47	43.67	1.076
50	29	23.65	1.226	75	60.37	1.242
55	39	31.23	1.249	92	80.28	1.146
60	43	37.98	1.132	78	76.31	1.022
65	21	19.90	1.055	26	28.68	0.907
70	13	8.92	1.457	12	9.37	1.281
75	6	3.09	1.942	6	2.76	2.174
TOTAL	224	188.84	1.186	410	376.76	1.088

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF DISABILITY RETIREMENTS  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
30	0	0.25	0.000	0	1.27	0.000
35	5	1.42	3.521	8	8.09	0.989
40	14	5.38	2.602	24	28.58	0.840
45	14	15.04	0.931	49	61.96	0.791
50	34	32.54	1.045	106	139.71	0.759
54	15	17.85	0.840	64	79.99	0.800
TOTAL	82	72.48	1.131	251	319.60	0.785

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 COMPARISON OF SALARY SCALE TO ACTUAL SALARY INCREASES  
 ASSUMPTIONS ADOPTED OCTOBER 2011

MALE

CENTRAL <u>AGE</u>	ACTUAL <u>SALARIES</u>	EXPECTED <u>SALARIES</u>	RATIO OF ACTUAL TO EXPECTED
20	23,846,111	21,554,987	1.106
25	823,856,993	815,442,670	1.010
30	2,100,240,127	2,133,297,946	0.985
35	3,012,972,528	3,066,471,396	0.983
40	3,408,431,276	3,462,101,738	0.984
45	2,925,856,838	2,966,881,187	0.986
50	2,603,448,823	2,637,670,455	0.987
55	2,613,095,769	2,651,757,829	0.985
60	1,783,334,081	1,815,008,012	0.983
65	473,228,629	483,972,132	0.978
70	82,362,862	84,368,897	0.976
75	30,437,576	30,793,540	0.988
TOTAL	19,881,111,613	20,169,320,789	0.986

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 COMPARISON OF SALARY SCALE TO ACTUAL SALARY INCREASES  
 ASSUMPTIONS ADOPTED OCTOBER 2011

**FEMALE**

CENTRAL <u>AGE</u>	ACTUAL <u>SALARIES</u>	EXPECTED <u>SALARIES</u>	RATIO OF ACTUAL TO <u>EXPECTED</u>
20	91,606,677	77,476,628	1.182
25	2,729,068,292	2,710,264,713	1.007
30	5,923,539,664	6,033,940,517	0.982
35	7,179,629,329	7,290,201,108	0.985
40	8,028,403,002	8,135,621,107	0.987
45	7,521,117,800	7,627,956,276	0.986
50	7,841,591,600	7,953,377,413	0.986
55	8,173,821,262	8,289,282,806	0.986
60	5,543,269,417	5,631,968,902	0.984
65	1,248,184,137	1,270,410,902	0.983
70	216,998,495	220,385,501	0.985
75	55,328,733	56,225,880	0.984
TOTAL	54,552,558,408	55,297,111,753	0.987

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF WITHDRAWALS  
 EXPOSURE BASED ON ACTIVE TEACHERS  
 ASSUMPTIONS ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
20	422	415.56	1.015	1,127	1,328.67	0.848
25	3,194	2,893.52	1.104	10,379	9,421.20	1.102
30	2,530	2,091.62	1.210	8,378	7,735.67	1.083
35	1,531	1,357.83	1.128	5,881	5,758.24	1.021
40	1,142	1,113.29	1.026	4,516	4,426.67	1.020
45	946	924.96	1.023	3,929	3,649.82	1.076
50	863	817.39	1.056	3,604	3,285.50	1.097
54	321	305.37	1.051	1,142	1,077.08	1.060
TOTAL	10,949	9,919.54	1.104	38,956	36,682.85	1.062

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF DEATHS AMONG MEMBERS RETIRED FOR DISABILITY  
 MORTALITY ADOPTED OCTOBER 2011

CENTRAL <u>AGE</u>	MALE			FEMALE		
	<u>ACTUAL</u>	<u>EXPECTED</u>	RATIO OF ACTUAL TO <u>EXPECTED</u>	<u>ACTUAL</u>	<u>EXPECTED</u>	RATIO OF ACTUAL TO <u>EXPECTED</u>
30	0	0.00	0.000	0	0.00	0.000
35	3	0.44	6.818	5	1.37	3.650
40	5	2.43	2.058	5	4.16	1.202
45	3	3.93	0.763	20	14.26	1.403
50	10	13.86	0.722	33	39.70	0.831
55	17	13.43	1.266	67	68.74	0.975
60	16	21.86	0.732	67	71.05	0.943
65	22	23.49	0.937	39	50.33	0.775
70	15	18.51	0.810	29	27.74	1.045
75	15	14.52	1.033	26	21.27	1.222
80	12	15.44	0.777	34	24.17	1.407
85	15	11.30	1.327	18	24.13	0.746
90	2	4.26	0.469	10	16.71	0.598
95	1	0.64	1.563	7	6.35	1.102
100	0	0.00	0.000	3	2.48	1.210
105	0	0.00	0.000	1	1.09	0.917
110	0	0.00	0.000	0	0.00	0.000
TOTAL	136	144.11	0.944	364	373.55	0.974

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF DEATHS AMONG MEMBERS RETIRED FOR SERVICE  
 MORTALITY ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
55	24	18.30	1.311	54	44.35	1.218
60	176	181.55	0.969	272	309.42	0.879
65	395	466.97	0.846	536	579.29	0.925
70	567	583.43	0.972	629	642.49	0.979
75	864	845.16	1.022	780	801.19	0.974
80	1,265	1,260.91	1.003	1,244	1,276.19	0.975
85	1,297	1,328.49	0.976	1,683	1,691.17	0.995
90	917	863.55	1.062	1,892	1,851.90	1.022
95	384	348.12	1.103	1,354	1,220.65	1.109
100	64	58.96	1.085	467	366.09	1.276
105	4	2.70	1.481	73	47.62	1.533
110	0	0.00	0.000	1	0.34	2.941
TOTAL	5,957	5,958.14	1.000	8,985	8,830.70	1.017

APPENDIX 10 (Cont'd.)

2009-2013 EXPERIENCE STUDY  
 NUMBER OF DEATHS AMONG BENEFICIARIES  
 MORTALITY ADOPTED OCTOBER 2011

CENTRAL AGE	MALE			FEMALE		
	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED	ACTUAL	EXPECTED	RATIO OF ACTUAL TO EXPECTED
5	0	0.00	0.000	0	0.00	0.000
10	0	0.00	0.000	0	0.00	0.000
15	0	0.00	0.000	0	0.00	0.000
20	0	0.00	0.000	0	0.00	0.000
25	0	0.00	0.000	0	0.00	0.000
30	0	0.00	0.000	0	0.00	0.000
35	0	0.03	0.000	0	0.00	0.000
40	0	0.05	0.000	0	0.02	0.000
45	1	0.07	14.286	0	0.06	0.000
50	0	0.17	0.000	0	0.17	0.000
55	1	0.46	2.174	0	0.88	0.000
60	3	1.71	1.754	4	3.54	1.130
65	7	5.01	1.397	15	10.69	1.403
70	5	8.63	0.579	34	23.87	1.424
75	23	18.72	1.229	61	50.21	1.215
80	51	45.39	1.124	130	111.65	1.164
85	100	75.36	1.327	221	215.87	1.024
90	102	98.68	1.034	303	294.68	1.028
95	49	70.02	0.700	199	177.29	1.122
100	15	13.22	1.135	63	46.29	1.361
105	0	0.00	0.000	8	7.60	1.053
110	0	0.00	0.000	1	1.02	0.980
TOTAL	357	337.52	1.058	1,039	943.84	1.101



APPENDIX 10 (Cont'd.)

Investment Rate of Return<sup>1</sup>  
on  
Market and Actuarial Value of Assets

as of June 30, 2013

Annualized rates of return over the last:

	<u>Based Upon Market Value of Assets</u>	<u>Based Upon Actuarial Value of Assets<sup>2</sup></u>
1 Year:	13.7%	5.3%
3 Years:	13.0%	3.1%
5 Years:	5.2%	3.7%
10 Years:	7.5%	6.9%
15 Years:	5.7%	6.4%
20 Years:	8.3%	
25 Years:	9.1%	

Annualized inflation over the last:

	<u>Inflation Assumption</u>		<u>COLA Benefit</u>	
	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected<sup>3</sup></u>
1 Year:	1.47%	3.0%	1.0 %	1.625%
3 Years:	2.27%	3.0%	1.3%	1.625%
5 Years:	1.74%	3.0%	1.2%	1.625%

<sup>1</sup> The interest rate for valuation purposes is a level 8.0%.

<sup>2</sup> Effective June 30, 2007, the Retirement System's asset valuation method was changed.

<sup>3</sup> The annual percentage for estimating future COLA benefit payments is 1.625%. The COLA percentage is one-half of the increase in the CPI with a floor of 1.0% and a cap of 3.0%. Therefore the estimate of inflation for the COLA benefit is the result of analyzing available CPI data with percentages bounded between 2.0% and 6.0%, and reduced by 50%. The COLA benefit was first initiated in 2001.

APPENDIX 11

**ASSET ALLOCATION**

The table below displays the Retirement System's asset allocation targets, actual allocation percentages, and ranges as of June 30, 2013.

	<b>Target</b>	<b>Actual</b>	<b>Range</b>
<b>Domestic Equity</b>	37%	40.6%	32-42%
<b>International Equity</b>	18%	18.3%	14-22%
<b>Real Estate</b>	10%	11.1%	6-14%
<b>Private Equity</b>	<u>7%</u>	<u>8.3%</u>	4-12%
<i>Total Equities</i>	72%	78.3%	
<b>Domestic Fixed Income</b>	18%	13.2%	13-23%
<b>Global Bonds</b>	2%	0.4%	0-3%
<b>Mortgages</b>	8%	5.4%	5-11%
<b>Cash Equivalents</b>	<u>0%</u>	<u>2.7%</u>	0-5%
<i>Total Fixed Income</i>	28%	21.7%	

## APPENDIX 12

### SENSITIVITY ANALYSIS

Valuation results are highly dependent on the actuarial assumptions used to project future events. If actual experience emerges differently from the assumptions used in the valuation process, actuarial gains or losses will result, and future Employer Contribution Rates will be higher or lower. In this section, results of a sensitivity analysis are presented in order to illustrate how deviations in specific assumptions would have changed the current Employer Contribution Rate of 17.53%.

It is important to note that the results displayed here, with the exception of those for the investment return, are the consequence of altering each assumption individually without accounting for possible correlation between assumptions. Therefore, these results are presented in order to provide an illustration as to the order of magnitude that a variation in key assumptions could have on valuation results. There is no guarantee that future experience will be consistent with either our current or the following alternative set of assumptions.

<u>Assumption</u>	<u>Adjustment Made</u>	<u>Calculated Employer Contribution Rate</u>
<b>Current Assumptions</b>		<b>17.53%</b>
<b>Investment Return<sup>1</sup></b>	Decrease from 8.0% to 7.75%	19.58%
<b>Investment Return<sup>1</sup></b>	Decrease from 8.0% to 7.5%	21.66%
<b>Investment Return<sup>1</sup></b>	Decrease from 8.0% to 7.0%	26.02%
<b>Salary Scale</b>	Decrease of 10%	16.31%
<b>Salary Scale</b>	Increase of 10%	18.75%
<b>Service Retirement Rates</b>	Decrease of 10%	16.51%
<b>Service Retirement Rates</b>	Increase of 10%	18.48%
<b>Healthy Annuitant Mortality</b>	Decrease of 10%	18.83%
<b>Healthy Annuitant Mortality</b>	Increase of 10%	16.32%
<b>Active Mortality</b>	Decrease of 10%	17.54%
<b>Active Mortality</b>	Increase of 10%	17.52%

<sup>1</sup> In the event that a change to the long term investment return assumption would be warranted, it is likely that a related change to the salary scale assumption would also be necessary in order for these assumptions to remain consistent with overall inflation. Therefore, for the results presented here, the salary scale assumption was decreased by one-half of the reduction in the investment return assumption.

APPENDIX 13

**HISTORY OF THE EMPLOYER CONTRIBUTION RATE**

<u>Salary Year</u>	<u>Employer Contribution Rate</u>	<u>Salary Year</u>	<u>Employer Contribution Rate</u>	<u>Salary Year</u>	<u>Employer Contribution Rate</u>
1921-22	5.10 %	1956-57	10.90 %	1991-92	6.64 %
1922-23	5.10	1957-58	11.20	1992-93	8.00
1923-24	5.20	1958-59	13.40	1993-94	8.41
1924-25	5.20	1959-60	14.00	1994-95	7.24
1925-26	5.20	1960-61	18.35	1995-96	6.37
1926-27	5.20	1961-62	18.55	1996-97	3.57
1927-28	5.20	1962-63	19.55	1997-98	1.25
1928-29	5.30	1963-64	21.13	1998-99	1.42
1929-30	5.50	1964-65	17.67	1999-00	1.43
1930-31	5.50	1965-66	17.70	2000-01	0.43
1931-32	5.50	1966-67	17.72	2001-02	0.36
1932-33	5.50	1967-68	18.50	2002-03	0.36
1933-34	5.50	1968-69	18.80	2003-04	2.52
1934-35	5.60	1969-70	18.60	2004-05	5.63
1935-36	5.70	1970-71	18.80	2005-06	7.97
1936-37	5.80	1971-72	18.80	2006-07	8.60
1937-38	5.93	1972-73	18.80	2007-08	8.73
1938-39	6.03	1973-74	18.80	2008-09	7.63
1939-40	6.13	1974-75	18.80	2009-10	6.19
1940-41	6.23	1975-76	19.40	2010-11	8.62
1941-42	6.33	1976-77	19.40	2011-12	11.11
1942-43	6.43	1977-78	20.40	2012-13	11.84
1943-44	6.53	1978-79	21.40	2013-14	16.25
1944-45	7.10	1979-80	22.49	2014-15	17.53
1945-46	7.20	1980-81	23.49		
1946-47	7.50	1981-82	23.49	<b>Average</b>	<b>10.93 %</b>
1947-48	7.80	1982-83	23.49		
1948-49	8.00	1983-84	22.90		
1949-50	8.40	1984-85	22.80		
1950-51	8.80	1985-86	21.40		
1951-52	9.60	1986-87	18.80		
1952-53	9.90	1987-88	16.83		
1953-54	9.90	1988-89	14.79		
1954-55	10.30	1989-90	6.87		
1955-56	10.40	1990-91	6.84		

APPENDIX 14

**HISTORY OF THE MEMBER CONTRIBUTION RATE**

<u>Year of Membership</u>	<u>Required Contribution</u>
1921	4%
1948	5% (new members - 1948 and after)
1948	Voluntary 4% <u>could</u> be contributed (all members eligible)
1951	If member elected special retirement allowance: 4% went to 6.5%, 5% went to 8% (all members eligible)
1957	If member elected 1/120th plan: 6.5% went to 9%, 8% went to 11% (all members eligible)
1968	0%
1976	3% (new members - 1976 and after)
2000	3% employee contribution ceases after ten years of service or membership
2010	3.5% throughout career for members joining 1/1/2010 – 3/31/2012
2012	Throughout career for members joining on or after 4/1/2012: <ul style="list-style-type: none"> <li>- 3.0% if salary less than or equal to \$45,000</li> <li>- 3.5% if salary greater than \$45,000 and less than or equal to \$55,000</li> <li>- 4.5% if salary greater than \$55,000 and less than or equal to \$75,000</li> <li>- 5.75% if salary greater than \$75,000 and less than or equal to \$100,000</li> <li>- 6.0% if salary greater than \$100,000 and less than or equal to \$179,000</li> </ul>

As of August 1, 1921, when the Retirement System was established, members contributed 4% of salary. These contributions were used to fund a separate annuity, over and above the regular pension. New members on or after July 1, 1948 were required to contribute 5% of salary. Additional contributions, not in excess of 4% of salary, were permitted during the five-year period beginning July 1, 1948.

Under the provisions of a law passed in 1950, members could elect before July 1, 1951, or within one year of their date of membership, if later, to contribute towards a special service retirement allowance that would allow them to retire up to five years earlier. If their rate of contribution had been 4%, their new rate would be 6.5%. If their rate of contribution had been 5%, their new rate would be 8%. In 1956, an amendment was passed which provided additional benefits for service in excess of 25 years, but not in excess of 35 years, for those members who elected to contribute an additional 2.5% or 3% of their salaries. This increased the rate of contribution to 9% or 11% depending on whether the member's rate of contribution had been 6.5% or 8%.

Throughout the 1960's the advent of the "take-home pay" program effectively reduced the required contribution rate to zero for many members. As of July 1, 1968, all members were no longer required to make contributions, nor permitted to make voluntary contributions unless they had been making them previously.

**HISTORY OF THE MEMBER CONTRIBUTION RATE (Cont'd.)**

The law that created Tier 3 in 1976 reinstated member contributions and required members who joined the System after July 26, 1976 to contribute 3% of their annual salary. This money, however, helps fund the member's pension and does not fund a separate annuity as before. Effective October 1, 2000, however, in accordance with Chapter 126 of the Laws of 2000, the 3% required member contribution ceases upon the attainment of the earlier of 10 years of service credit or 10 years of membership.

In accordance with Tier 5, enacted in 2009, members joining on or after January 1, 2010 and prior to April 1, 2012 must contribute 3.5% of salary throughout their working career towards the funding of their pension. Tier 6, enacted in 2012, requires members joining on or after April 1, 2012 to contribute between 3.0% and 6.0% of salary throughout their working career towards the funding of their pension. The contribution percentage for Tier 6 members can vary during their working career depending on the salary received.

**ACTUARIAL COST AND ASSET VALUATION METHODS**

1. Actuarial Cost Method

The cost method used to determine the liabilities and normal cost in this valuation is the Aggregate Cost Method. This funding method is required by statute, specifically Section 517 of the New York State Education Law.

Each year a normal rate percentage is developed as a level percentage of total member compensation. This percentage equals the portion of the actuarial present value of projected benefits which exceeds the actuarial value of assets divided by one percent of the present value of future compensation of the active members, as of the valuation date.

The cost of active member death benefits up to \$50,000, Retirement System administrative expenses, and benefits in excess of the IRC §415 limits are each determined using a one-year term cost method.

Each year, actuarial gains and losses will occur because actual experience will vary from the actuarial assumptions. All gains and losses are automatically amortized as part of the normal rate, over the expected future working lifetime of active members.

2. Asset Valuation Method

The actuarial value of assets is determined by recognizing each year's realized and unrealized appreciation, in excess of (or less than) an assumed inflationary gain of 3%, at a rate of 20% per year, until fully recognized after five years.

**PRESENT ACTUARIAL ASSUMPTIONS**

Actuarial assumptions have been developed based upon actual member experience. Various actuarial and graduation techniques are applied to experience data and tables are developed. An experience study is performed annually and assumptions are revised when warranted. The current actuarial assumptions were adopted by the Retirement Board on October 27, 2011.

Table of Contents

- I. Active Mortality Rates
- II. Disability Retirement Rates
- III. Withdrawal Rates
  - a) Males
  - b) Females
- IV. Retirement Rates
  - a) Tier 1 Members and Tier 2, 3 and 4 Members at Least Age 62 or with 30 Years of Service and Tier 5 Members at Least Age 62
  - b) Tier 2, 3 and 4 Members Less Than Age 62 and with Less than 30 Years of Service
  - c) Tier 5 Members Less Than Age 62 and with Less than 30 Years of Service
  - d) Tier 5 Members Less Than Age 62 and with 30 Years of Service
  - e) Tier 6 Members
- V. Service and Deferred Annuitant and Beneficiary Mortality Rates
- VI. Disabled Annuitant Mortality Rates
- VII. Salary Scale
- VIII. Valuation Interest Assumption



APPENDIX 16 (Cont'd.)

Mortality Rates  
for Active Members

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
20	0.000042	20	0.000040
21	0.000092	21	0.000050
22	0.000107	22	0.000057
23	0.000136	23	0.000068
24	0.000139	24	0.000072
25	0.000147	25	0.000086
26	0.000156	26	0.000102
27	0.000163	27	0.000117
28	0.000178	28	0.000118
29	0.000191	29	0.000119
30	0.000200	30	0.000142
31	0.000229	31	0.000148
32	0.000242	32	0.000163
33	0.000260	33	0.000175
34	0.000279	34	0.000176
35	0.000291	35	0.000186
36	0.000313	36	0.000202
37	0.000330	37	0.000212
38	0.000352	38	0.000222
39	0.000373	39	0.000239
40	0.000394	40	0.000257
41	0.000430	41	0.000277
42	0.000453	42	0.000300
43	0.000513	43	0.000334
44	0.000576	44	0.000361
45	0.000616	45	0.000388
46	0.000656	46	0.000411
47	0.000683	47	0.000432
48	0.000702	48	0.000465
49	0.000721	49	0.000482
50	0.000747	50	0.000511
51	0.000787	51	0.000544
52	0.000800	52	0.000587
53	0.000835	53	0.000622
54	0.000869	54	0.000658

APPENDIX 16 (Cont'd.)

Mortality Rates  
for Active Members  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.000937	55	0.000683
56	0.001093	56	0.000724
57	0.001293	57	0.000762
58	0.001416	58	0.000816
59	0.001588	59	0.000895
60	0.001747	60	0.000954
61	0.001897	61	0.001051
62	0.002111	62	0.001114
63	0.002412	63	0.001199
64	0.002892	64	0.001303
65	0.003396	65	0.001458
66	0.003811	66	0.001625
67	0.004599	67	0.001782
68	0.005510	68	0.002011
69	0.006500	69	0.002252
70	0.007502	70	0.002532
71	0.008523	71	0.003019
72	0.009511	72	0.003310
73	0.010552	73	0.003811
74	0.011521	74	0.004123
75	0.012798	75	0.004599

APPENDIX 16 (Cont'd.)

Disability Retirement Rates  
for Active Members

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
30	0.000005	30	0.000005
31	0.000010	31	0.000018
32	0.000015	32	0.000032
33	0.000020	33	0.000046
34	0.000027	34	0.000054
35	0.000033	35	0.000080
36	0.000038	36	0.000090
37	0.000045	37	0.000089
38	0.000061	38	0.000113
39	0.000085	39	0.000174
40	0.000109	40	0.000220
41	0.000152	41	0.000300
42	0.000210	42	0.000387
43	0.000272	43	0.000440
44	0.000340	44	0.000482
45	0.000405	45	0.000545
46	0.000490	46	0.000589
47	0.000602	47	0.000675
48	0.000747	48	0.000773
49	0.000917	49	0.000992
50	0.001051	50	0.001222
51	0.001180	51	0.001430
52	0.001290	52	0.001575
53	0.001380	53	0.001675
54	0.001440	54	0.001725

APPENDIX 16 (Cont'd.)

Withdrawal Rates  
for Active Members

Males

Age	10 or more Years of Service										
	0 Years of Service	1 Year of Service	2 Years of Service	3 Years of Service	4 Years of Service	5 Years of Service	6 Years of Service	7 Years of Service	8 Years of Service	9 Years of Service	10 Years of Service
20	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
21	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
22	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
23	0.259944	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
24	0.272583	0.093433	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
25	0.285222	0.100846	0.064593	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
26	0.297861	0.108259	0.070858	0.048649	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
27	0.310500	0.115672	0.077123	0.051379	0.037015	0.022000	0.012711	0.010469	0.009177	0.008490	0.007368
28	0.323138	0.123086	0.083389	0.054108	0.039868	0.024169	0.012711	0.010469	0.009177	0.008490	0.007368
29	0.335777	0.130499	0.089654	0.056838	0.042721	0.026338	0.013989	0.010469	0.009177	0.008490	0.007368
30	0.348416	0.137912	0.095919	0.059567	0.044623	0.028507	0.016544	0.011635	0.009177	0.008490	0.007368
31	0.344014	0.138382	0.095492	0.062415	0.045574	0.030677	0.019100	0.013968	0.011002	0.008490	0.007368
32	0.339612	0.138851	0.095065	0.065263	0.046525	0.032846	0.021655	0.016300	0.012828	0.008884	0.007368
33	0.335210	0.139321	0.094638	0.068111	0.047476	0.035015	0.024210	0.018633	0.014653	0.010462	0.007368
34	0.330808	0.139790	0.094211	0.070958	0.048426	0.037184	0.026766	0.020965	0.016479	0.012040	0.007368
35	0.326406	0.140260	0.093783	0.073806	0.049377	0.039353	0.029321	0.023297	0.018304	0.013303	0.007368
36	0.325430	0.138801	0.094647	0.074514	0.051198	0.040652	0.030587	0.024116	0.018515	0.014313	0.007506
37	0.324454	0.137343	0.095511	0.075223	0.053018	0.041951	0.031853	0.024934	0.018726	0.015323	0.007645
38	0.323478	0.135885	0.096374	0.075931	0.054839	0.043250	0.033119	0.025753	0.018936	0.016333	0.007783
39	0.322502	0.134426	0.097238	0.076640	0.056659	0.044548	0.034386	0.026571	0.019147	0.017343	0.007922
40	0.321526	0.132968	0.098101	0.077348	0.058480	0.045847	0.035652	0.027390	0.019358	0.018353	0.008061
41	0.315621	0.136402	0.101321	0.077187	0.058465	0.044883	0.035483	0.029326	0.020588	0.018597	0.008304
42	0.309716	0.139835	0.104541	0.077025	0.058451	0.043919	0.035314	0.031262	0.021819	0.018842	0.008547
43	0.303810	0.143269	0.107761	0.076864	0.058437	0.042954	0.035145	0.033198	0.023049	0.019087	0.008790
44	0.297905	0.146703	0.110981	0.076702	0.058423	0.041990	0.034976	0.035134	0.024280	0.019331	0.009033
45	0.292000	0.150136	0.114201	0.076541	0.058409	0.041026	0.034807	0.037070	0.025510	0.019576	0.009276
46	0.290773	0.154527	0.116641	0.080859	0.059296	0.043021	0.036045	0.039363	0.026291	0.019590	0.008957
47	0.289546	0.158918	0.119082	0.085177	0.060184	0.045016	0.037284	0.041656	0.027071	0.019603	0.008638
48	0.288320	0.163308	0.121523	0.089495	0.061071	0.047011	0.038522	0.043949	0.027851	0.019617	0.008319
49	0.287093	0.167699	0.123964	0.093813	0.061959	0.049007	0.039760	0.046242	0.028631	0.019631	0.008000
50	0.285866	0.172090	0.126404	0.098131	0.062847	0.051002	0.040998	0.048535	0.029412	0.019645	0.007681
51	0.284639	0.176480	0.128845	0.102449	0.063734	0.052997	0.042236	0.050828	0.030192	0.019658	0.007362
52	0.283413	0.180871	0.131286	0.106767	0.064622	0.054992	0.043475	0.053121	0.030972	0.019672	0.007043
53	0.282186	0.185262	0.133727	0.111085	0.065509	0.056988	0.044713	0.055414	0.031753	0.019686	0.006724
54	0.280959	0.189652	0.136168	0.115403	0.066397	0.058983	0.045951	0.057707	0.032533	0.019699	0.006405

APPENDIX 16 (Cont'd.)

Withdrawal Rates  
for Active Members

Females

Age	10 or more Years of Service										
	0 Years of Service	1 Year of Service	2 Years of Service	3 Years of Service	4 Years of Service	5 Years of Service	6 Years of Service	7 Years of Service	8 Years of Service	9 Years of Service	10 Years of Service
20	0.246985	0.093652	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
21	0.246985	0.093652	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
22	0.252705	0.093652	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
23	0.264144	0.100160	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
24	0.275583	0.106668	0.057894	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
25	0.287022	0.113175	0.065741	0.046566	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
26	0.298461	0.119683	0.073589	0.051834	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
27	0.309900	0.126190	0.081437	0.057103	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
28	0.321339	0.132698	0.089285	0.062371	0.049651	0.040533	0.040279	0.031433	0.030269	0.029859	0.023495
29	0.332779	0.139205	0.097132	0.067640	0.057959	0.048790	0.044087	0.031433	0.030269	0.029859	0.023495
30	0.344218	0.145713	0.104980	0.072908	0.063498	0.057047	0.047896	0.033283	0.031649	0.029859	0.023495
31	0.337149	0.143990	0.102994	0.076587	0.066267	0.065304	0.051704	0.036984	0.034408	0.029859	0.023495
32	0.330080	0.142268	0.101008	0.080267	0.069037	0.068562	0.055512	0.040686	0.038771	0.030520	0.023495
33	0.323011	0.140545	0.099023	0.083946	0.071806	0.071482	0.059321	0.044387	0.043134	0.033165	0.023495
34	0.315943	0.138822	0.097037	0.087625	0.074576	0.072579	0.063129	0.048088	0.047165	0.035810	0.023495
35	0.308874	0.137100	0.095051	0.091304	0.077345	0.071809	0.066937	0.051790	0.051195	0.038455	0.022675
36	0.301485	0.131968	0.093169	0.085419	0.072583	0.067681	0.061670	0.048941	0.041891	0.036339	0.021034
37	0.294097	0.126836	0.091287	0.079533	0.067822	0.063553	0.056403	0.046092	0.038337	0.034223	0.019393
38	0.286709	0.121704	0.089405	0.073647	0.063060	0.059425	0.051135	0.043243	0.034782	0.032107	0.017752
39	0.279321	0.116572	0.087522	0.067761	0.058298	0.055298	0.047553	0.040394	0.031227	0.029991	0.016111
40	0.271932	0.111440	0.085640	0.061875	0.053536	0.051170	0.043971	0.037545	0.027672	0.027875	0.014471
41	0.272086	0.112626	0.084583	0.062068	0.053566	0.048726	0.041349	0.035634	0.027143	0.026346	0.013501
42	0.272240	0.113812	0.083526	0.062260	0.053596	0.046282	0.038726	0.033722	0.026614	0.024818	0.012531
43	0.272393	0.114998	0.082468	0.062452	0.053626	0.043838	0.036103	0.031810	0.026085	0.023289	0.011560
44	0.272547	0.116185	0.081411	0.062644	0.053656	0.041395	0.033481	0.029899	0.025555	0.021760	0.010590
45	0.272700	0.117371	0.080354	0.062837	0.053686	0.038951	0.030858	0.027987	0.025026	0.020231	0.009620
46	0.276387	0.119587	0.083107	0.064476	0.053600	0.040789	0.031262	0.028348	0.025804	0.020103	0.009440
47	0.280073	0.121803	0.085860	0.066116	0.053514	0.042628	0.031667	0.028708	0.026581	0.019974	0.009259
48	0.283759	0.124019	0.088614	0.067756	0.053428	0.044466	0.032071	0.029069	0.027359	0.019846	0.009079
49	0.287445	0.126235	0.091367	0.069395	0.053342	0.046304	0.032476	0.029429	0.028136	0.019717	0.008899
50	0.291131	0.128450	0.094120	0.071035	0.053256	0.048143	0.032880	0.029790	0.028914	0.019589	0.008718
51	0.294817	0.130666	0.096873	0.072674	0.053170	0.049981	0.033284	0.030151	0.029691	0.019461	0.008538
52	0.298503	0.132882	0.099627	0.074314	0.053084	0.051820	0.033689	0.030511	0.030469	0.019332	0.008357
53	0.302189	0.135098	0.102380	0.075954	0.052997	0.053658	0.034093	0.030872	0.031246	0.019204	0.008177
54	0.305876	0.137314	0.105133	0.077593	0.052911	0.055496	0.034498	0.031232	0.032024	0.019075	0.007996

APPENDIX 16 (Cont'd.)

Service Retirement Rates  
 For Tier 1 Members and Tier 2, 3, and 4 Members  
 at Least Age 62 or with 30 Years of Service  
 and Tier 5 Members at Least Age 62

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.311756	55	0.311774
56	0.254224	56	0.249599
57	0.187021	57	0.163685
58	0.201230	58	0.173078
59	0.217976	59	0.177174
60	0.225532	60	0.190579
61	0.227859	61	0.204671
62	0.211386	62	0.221966
63	0.178082	63	0.181851
64	0.134752	64	0.159849
65	0.174277	65	0.200559
66	0.197891	66	0.189809
67	0.115544	67	0.161544
68	0.126412	68	0.169583
69	0.095163	69	0.157879
70	0.134313	70	0.169101
71	0.132847	71	0.173372
72	0.083523	72	0.123957
73	0.060934	73	0.126204
74	0.140439	74	0.118774
75	0.165500	75	0.153458

APPENDIX 16 (Cont'd.)

Service Retirement Rates  
 For Tier 2, 3, and 4 Members Less Than Age 62  
 and with Less Than 30 Years of Service

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.034627	55	0.042183
56	0.029994	56	0.036835
57	0.028821	57	0.035166
58	0.037932	58	0.040023
59	0.034563	59	0.042266
60	0.047151	60	0.048490
61	0.053363	61	0.062749

APPENDIX 16 (Cont'd.)

Service Retirement Rates  
 For Tier 5 Members Less Than Age 62  
 and with Less Than 30 Years of Service

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.017313	55	0.021092
56	0.014997	56	0.018418
57	0.014411	57	0.017583
58	0.018966	58	0.020012
59	0.017281	59	0.021133
60	0.023575	60	0.024245
61	0.026682	61	0.031375



APPENDIX 16 (Cont'd.)

Service Retirement Rates  
For Tier 5 Members Less Than Age 62  
and with 30 Years of Service

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.017313	55	0.021092
56	0.014997	56	0.018418
57	0.311756	57	0.311774
58	0.254224	58	0.249599
59	0.187021	59	0.163685
60	0.201230	60	0.173078
61	0.217976	61	0.177174

APPENDIX 16 (Cont'd.)

Service Retirement Rates  
For Tier 6 Members

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
55	0.017313	55	0.021092
56	0.014997	56	0.018418
57	0.014411	57	0.017583
58	0.018966	58	0.020012
59	0.017281	59	0.021133
60	0.023575	60	0.024245
61	0.026682	61	0.031375
62	0.026682	62	0.031375
63	0.311756	63	0.311774
64	0.254224	64	0.249599
65	0.187021	65	0.163685
66	0.201230	66	0.173078
67	0.217976	67	0.177174
68	0.225532	68	0.190579
69	0.227859	69	0.204671
70	0.211386	70	0.221966
71	0.178082	71	0.181851
72	0.134752	72	0.159849
73	0.174277	73	0.200559
74	0.197891	74	0.189809
75	0.115544	75	0.161544

APPENDIX 16 (Cont'd.)

Mortality Rates for Service  
and Deferred Annuitants and Beneficiaries  
(Also used in calculating the benefits pursuant to  
Subdivision b.3 of Section 512 of the Education Law)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
1	0.000485	1	0.000435
2	0.000327	2	0.000283
3	0.000272	3	0.000212
4	0.000212	4	0.000158
5	0.000194	5	0.000143
6	0.000186	6	0.000134
7	0.000178	7	0.000126
8	0.000164	8	0.000112
9	0.000159	9	0.000107
10	0.000161	10	0.000107
11	0.000167	11	0.000109
12	0.000174	12	0.000113
13	0.000183	13	0.000118
14	0.000196	14	0.000127
15	0.000208	15	0.000137
16	0.000219	16	0.000144
17	0.000232	17	0.000152
18	0.000244	18	0.000155
19	0.000255	19	0.000155
20	0.000266	20	0.000154
21	0.000279	21	0.000152
22	0.000290	22	0.000154
23	0.000304	23	0.000158
24	0.000315	24	0.000164
25	0.000328	25	0.000171
26	0.000349	26	0.000182
27	0.000357	27	0.000189
28	0.000367	28	0.000200
29	0.000385	29	0.000211
30	0.000415	30	0.000231

APPENDIX 16 (Cont'd.)

Mortality Rates for Service  
and Deferred Annuitants and Beneficiaries  
(Also used in calculating the benefits pursuant to  
Subdivision b.3 of Section 512 of the Education Law)  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
31	0.000466	31	0.000275
32	0.000525	32	0.000314
33	0.000590	33	0.000349
34	0.000656	34	0.000380
35	0.000722	35	0.000409
36	0.000786	36	0.000437
37	0.000845	37	0.000464
38	0.000889	38	0.000494
39	0.000929	39	0.000528
40	0.000968	40	0.000576
41	0.001011	41	0.000631
42	0.001061	42	0.000695
43	0.001119	43	0.000764
44	0.001187	44	0.000839
45	0.001264	45	0.000904
46	0.001336	46	0.000970
47	0.001414	47	0.001038
48	0.001496	48	0.001122
49	0.001583	49	0.001213
50	0.001673	50	0.001330
51	0.001890	51	0.001490
52	0.002030	52	0.001668
53	0.002220	53	0.001875
54	0.002433	54	0.002116
55	0.002538	55	0.002355
56	0.002780	56	0.002509
57	0.003056	57	0.002672
58	0.003370	58	0.002843
59	0.003709	59	0.003041
60	0.004093	60	0.003267

APPENDIX 16 (Cont'd.)

Mortality Rates for Service  
and Deferred Annuitants and Beneficiaries  
(Also used in calculating the benefits pursuant to  
Subdivision b.3 of Section 512 of the Education Law)  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
61	0.004551	61	0.003527
62	0.005047	62	0.003826
63	0.005638	63	0.004168
64	0.006278	64	0.004561
65	0.007004	65	0.005012
66	0.007867	66	0.005529
67	0.008804	67	0.006122
68	0.009816	68	0.006803
69	0.011014	69	0.007584
70	0.012307	70	0.008480
71	0.013835	71	0.009459
72	0.015565	72	0.010631
73	0.017524	73	0.011914
74	0.019741	74	0.013446
75	0.022362	75	0.015125
76	0.025213	76	0.017127
77	0.028581	77	0.019517
78	0.032405	78	0.022155
79	0.036746	79	0.025174
80	0.041671	80	0.028627
81	0.047254	81	0.032576
82	0.053580	82	0.037089
83	0.060435	83	0.042242
84	0.068492	84	0.048122
85	0.077205	85	0.055103
86	0.086987	86	0.063094
87	0.098446	87	0.072230
88	0.111338	88	0.082248
89	0.125188	89	0.094083
90	0.141337	90	0.107017

APPENDIX 16 (Cont'd.)

Mortality Rates for Service  
and Deferred Annuity and Beneficiaries  
(Also used in calculating the benefits pursuant to  
Subdivision b.3 of Section 512 of the Education Law)  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
91	0.158600	91	0.121632
92	0.178646	92	0.133966
93	0.199938	93	0.147979
94	0.223410	94	0.162252
95	0.250439	95	0.176070
96	0.270403	96	0.187908
97	0.288938	97	0.199611
98	0.311066	98	0.209895
99	0.325777	99	0.221434
100	0.339933	100	0.231938
101	0.358628	101	0.244834
102	0.371685	102	0.254498
103	0.383040	103	0.266044
104	0.392003	104	0.279055
105	0.397886	105	0.293116
106	0.400000	106	0.307811
107	0.400000	107	0.322725
108	0.400000	108	0.337441
109	0.400000	109	0.351544
110	0.400000	110	0.364617

## APPENDIX 16 (Cont'd.)

Mortality Rates for  
Disabled Annuitants

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
30	0.021045	30	0.037191
31	0.022268	31	0.039790
32	0.025123	32	0.041804
33	0.030890	33	0.042036
34	0.035471	34	0.044687
35	0.040060	35	0.046087
36	0.045043	36	0.047456
37	0.051671	37	0.048137
38	0.057059	38	0.049542
39	0.060136	39	0.050006
40	0.066075	40	0.051448
41	0.072010	41	0.053712
42	0.081075	42	0.056153
43	0.088267	43	0.058391
44	0.095107	44	0.059102
45	0.098034	45	0.060023
46	0.098073	46	0.061115
47	0.096203	47	0.061499
48	0.092171	48	0.062033
49	0.090039	49	0.061267
50	0.088106	50	0.059644
51	0.085180	51	0.059103
52	0.082046	52	0.058019
53	0.077567	53	0.057648
54	0.069299	54	0.056312
55	0.059562	55	0.053003
56	0.050222	56	0.050651
57	0.043923	57	0.044260
58	0.040994	58	0.039761
59	0.040370	59	0.036583

## APPENDIX 16 (Cont'd.)

Mortality Rates for  
Disabled Annuitants  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
60	0.040254	60	0.034142
61	0.039865	61	0.033041
62	0.039284	62	0.031701
63	0.038507	63	0.032287
64	0.037749	64	0.032367
65	0.038009	65	0.032588
66	0.039816	66	0.034360
67	0.042679	67	0.034616
68	0.045317	68	0.034773
69	0.045826	69	0.035903
70	0.049085	70	0.036463
71	0.050661	71	0.037256
72	0.052953	72	0.038447
73	0.055112	73	0.040345
74	0.058231	74	0.042217
75	0.060057	75	0.045375
76	0.062590	76	0.048144
77	0.063405	77	0.051458
78	0.065189	78	0.052913
79	0.069245	79	0.055751
80	0.075091	80	0.060605
81	0.086987	81	0.070429
82	0.098446	82	0.080934
83	0.111338	83	0.090446
84	0.125188	84	0.100878
85	0.141337	85	0.120011
86	0.158600	86	0.138088
87	0.178646	87	0.147979
88	0.199938	88	0.162252
89	0.223410	89	0.176070



APPENDIX 16 (Cont'd.)

Mortality Rates for  
Disabled Annuitants  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
90	0.250439	90	0.187908
91	0.270403	91	0.199611
92	0.288938	92	0.209895
93	0.311066	93	0.221434
94	0.325777	94	0.231938
95	0.339933	95	0.244834
96	0.358628	96	0.254498
97	0.371685	97	0.266044
98	0.383040	98	0.279055
99	0.392003	99	0.293116
100	0.397886	100	0.307811
101	0.400000	101	0.322725
102	0.400000	102	0.337441
103	0.400000	103	0.351544
104	0.400000	104	0.364617
105	0.400000	105	0.376246
106	0.400000	106	0.386015
107	0.400000	107	0.393507
108	0.400000	108	0.398308
109	0.400000	109	0.400000
110	0.400000	110	0.400000

APPENDIX 16 (Cont'd.)

Salary Scale

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
20	1.1203	20	1.1198
21	1.1201	21	1.1177
22	1.1198	22	1.1162
23	1.1184	23	1.1139
24	1.1152	24	1.1101
25	1.1091	25	1.1035
26	1.1018	26	1.0954
27	1.0909	27	1.0857
28	1.0841	28	1.0770
29	1.0777	29	1.0720
30	1.0748	30	1.0684
31	1.0718	31	1.0660
32	1.0691	32	1.0644
33	1.0665	33	1.0636
34	1.0646	34	1.0630
35	1.0627	35	1.0626
36	1.0615	36	1.0622
37	1.0611	37	1.0614
38	1.0593	38	1.0602
39	1.0576	39	1.0591
40	1.0561	40	1.0582
41	1.0545	41	1.0572
42	1.0532	42	1.0562
43	1.0524	43	1.0553
44	1.0517	44	1.0546
45	1.0504	45	1.0539
46	1.0485	46	1.0530
47	1.0469	47	1.0523
48	1.0456	48	1.0516
49	1.0448	49	1.0506

APPENDIX 16 (Cont'd.)

Salary Scale  
(cont'd.)

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
50	1.0440	50	1.0497
51	1.0433	51	1.0485
52	1.0428	52	1.0474
53	1.0422	53	1.0461
54	1.0415	54	1.0449
55	1.0401	55	1.0442
56	1.0388	56	1.0435
57	1.0382	57	1.0424
58	1.0374	58	1.0416
59	1.0372	59	1.0413
60	1.0364	60	1.0410
61	1.0352	61	1.0402
62	1.0347	62	1.0393
63	1.0338	63	1.0386
64	1.0316	64	1.0383
65	1.0294	65	1.0376
66	1.0263	66	1.0367
67	1.0249	67	1.0352
68	1.0250	68	1.0341
69	1.0254	69	1.0329
70	1.0259	70	1.0328
71	1.0247	71	1.0326
72	1.0241	72	1.0325
73	1.0241	73	1.0322
74	1.0239	74	1.0309
75	1.0238	75	1.0308

## APPENDIX 16 (Cont'd.)

### Valuation Rate of Interest Assumption

The interest rate for valuation purposes is a level 8.0%. This valuation rate of interest is made up of a 3.0%<sup>1</sup> annual rate of inflation and a 5.0% real rate of return.

The valuation rate of interest assumption represents our best estimate of the anticipated annual rate of return on plan assets over a very long-term horizon.

The valuation rate of interest assumption is developed based upon the Retirement System's specific asset allocation, and capital market assumptions, based upon recommendations from Hewitt Ennis Knupp, the System's investment consultant. Using expected returns and standard deviations for each asset class, and including anticipated correlation between the classes, a long-term anticipated rate of return is developed. As of June 30, 2013, Hewitt Ennis Knupp has estimated the geometric annual rate of return to be 7.1%, and the arithmetic annual rate of return to be 8.1%, given the System's asset allocation. This analysis is performed annually, and intended to be over a 10-year time horizon. Additionally, Hewitt Ennis Knupp performed an asset/liability study in 2011 in which stochastic simulation was used to project over one thousand future investment outcomes over a 40-year period based on the Retirement System's asset allocation. The resulting distribution of the 40-year annualized returns had a mean of 8.1% and a median of 8.2%.

For a complete explanation of the reasons behind the System's valuation rate of interest assumption, please see pages 24 through 28 of the Report on the 2011 Recommended Actuarial Assumptions.

### Projected COLA Assumption

The annual percentage for estimating future COLA benefit payments is 1.625%.<sup>2</sup>

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<sup>1</sup> The average annual rate of increase in the Consumer Price Index (CPI) for 1925 – 2013 was 3.00%.

<sup>2</sup> The COLA percentage is one-half of the increase in the CPI with a floor of 1.0% and a cap of 3.0%. Therefore the estimate of inflation for the COLA benefit is the result of analyzing available CPI data with percentages bounded between 2.0% and 6.0%, and reduced by 50%.

## SUMMARY OF BENEFIT PROVISIONS

### 1. Membership

Membership is mandatory for all full-time New York State public school teachers, outside New York City, except those employed under the Comprehensive Employment and Training Act (CETA). Membership is optional for teachers employed on other than a full-time basis and for certain employees of the State University of New York, community colleges, and the State Education Department. Generally, the membership of any person credited with less than 5 years of service will terminate when seven years have elapsed since (s)he last rendered at least 20 days of credited service in a school year.

Tiers are determined by a member's most recent date of membership in the Retirement System as follows:

Tier 1:	Membership prior to 7/1/1973;
Tier 2:	Membership 7/1/1973 – 7/26/1976;
Tier 3:	Membership 7/27/1976 – 8/31/1983;
Tier 4:	Membership 9/1/1983 – 12/31/2009;
Tier 5:	Membership 1/1/2010 – 3/31/2012;
Tier 6:	Membership on or after 4/1/2012.

Tier 3 members are entitled to receive the benefits of either Tier 3 or Tier 4, however, they may not mix the provisions of the two tiers. For valuation purposes, Tier 3 members are assumed to receive the Tier 4 benefit at retirement, as that is generally always the larger benefit.

### 2. Service Retirement

The service retirement benefits are payable for life generally as follows:

#### Tier 1:

##### *Non-Contributory Plan*

For Tier 1 members with a date of membership prior to July 1, 1970 the benefit is generally calculated as:

##### *For New York State service prior to 7/1/1959 and all out-of-state service:*

1/100<sup>th</sup> of final average salary (FAS) per year for each of the first 25 years of service, plus 1/120<sup>th</sup> of FAS per year for each of the next 10 years of service, plus 1/140<sup>th</sup> of FAS per year for each year of NYS service in excess of 35, *plus*

##### *For New York State service subsequent to 7/1/1959:*

1/50<sup>th</sup> of final average salary (FAS) per year for each of the first 25 years of NYS service, plus 1/60<sup>th</sup> of FAS per year for each of the next 10 years of NYS service, plus 1/70<sup>th</sup> of FAS per year for each year of NYS service in excess of 35.

## APPENDIX 17 (Cont'd.)

Non-Contributory Plan members generally may retire at:

- Age 55 with 20 years of total service or
- Any age with 35 years of total service.

### Career Plan

If 20 or more years of NYS service: 2% of final average salary (FAS) per year of NYS service after July 1, 1959, plus 1.8% of FAS per year of NYS service prior to that date, plus 1% of FAS per year of out-of-state service. Out-of-state service is allowed only up to a maximum of 10 years, and only to the extent that it does not raise the total service credit to greater than 35 years. The maximum pension permitted is 75% of FAS.

If less than 20 years of NYS service, the above formula is used except the benefit is reduced by 5% for each year of service less than 20, subject to a maximum reduction of 50%.

Career Plan members generally may retire at:

- Age 55 with 2 years of NYS service or
- Any age with 35 years of total service.

The provisions of Article 19 of the Retirement and Social Security Law, effective July 11, 2000, provides to eligible Tier 1 and 2 members additional service credit of one-twelfth of a year of service for each year of retirement credit as of the date of retirement or death, up to a maximum of two additional years. The maximum pension, as a result of Article 19, can be 79% of FAS.

Tier 2: Computed under the Tier 1 Career Plan formula, but may be reduced for early retirement, as noted below.

Tier 2 members generally may retire at:

- Age 62 with 5 years of service,
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 6% for each of the first 2 years under age 62 and 3% for each of the next 5 years.

Tier 3:  $1\frac{2}{3}\%$  of FAS per year of NYS service (if less than 20 years) or 2% of FAS per year of NYS service (if 20 to 30 years). There is no additional benefit for more than 30 years of service. At age 62 the benefit is reduced by 50% of the primary Social Security benefit accrued while in NYS public employment. A member may be eligible for automatic cost-of-living adjustments.

Tier 3 members generally may retire at:

- Age 62 with 5 years of service,
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 1/15th for each of the first 2 years under age 62 and 1/30th for each of the next 5 years.

## APPENDIX 17 (Cont'd.)

Tier 4:  $1\frac{2}{3}\%$  of FAS per year of NYS service (if less than 20 years), or 2% of FAS per year of NYS service (if 20 to 30 years), plus  $1\frac{1}{2}\%$  of FAS per year of NYS service in excess of 30 years.

Tier 4 members generally may retire at:

- Age 62 with 5 years of service,
- Age 55 with 30 years of service, or
- Age 55 with 5 years of service, with benefit reduced by 6% for each of the first 2 years under age 62 and 3% for each of the next 5 years.

Tier 5:  $1\frac{2}{3}\%$  of FAS per year of NYS service (if less than 25 years), or 2% of FAS per year of NYS service (if 25 to 30 years), plus  $1\frac{1}{2}\%$  of FAS per year of NYS service in excess of 30 years.

Tier 5 members generally may retire at:

- Age 62 with 10 years of service,
- Age 57 with 30 years of service, or
- Age 55 with 10 years of service, with benefit reduced by  $6\frac{2}{3}\%$  for each of the first 2 years under age 62 and 5% for each of the next 5 years.

Tier 6:  $1\frac{2}{3}\%$  of FAS per year of NYS service (if less than 20 years), 1.75% of FAS per year of NYS service (if credited with 20 years) or 35% plus 2% per year of NYS service in excess of 20 years (if beyond 20 years).

Tier 6 members generally may retire at:

- Age 63 with 10 years of service,
- Age 55 with 10 years of service, with benefit reduced by 6.5% for each year under age 63.

### 3. Disability Retirement

Generally a member with at least 10 years of service may qualify for a disability retirement benefit of the smaller of 1)  $1\frac{2}{3}\%$  of FAS per year of projected service to age 60 or 2)  $\frac{1}{3}$  of FAS; but the benefit shall not be less than  $1\frac{2}{3}\%$  of FAS per year of completed service.

### 4. Death Benefits

#### *a) Active Service*

The Tier 1 death benefit is generally equal to the greater of 1) 3 times annual salary after 36 years of service (proportionately reduced for less than 36 years) or 2) for members who are at least age 55 with 20 years of service, the pension reserve calculated under a prior, lower service retirement formula.

## APPENDIX 17 (Cont'd.)

The death benefit for Tier 2, 3, 4, 5 and 6 members is generally equal to one of the following two options based on the member's election at entry: 1) 3 times annual salary after 3 years of service (proportionately reduced for service under 3 years) or 2) the greater of (1) above or the Tier 1 death benefit.

### *b) Not in Active Service*

The death benefit for members of all tiers with at least ten years of service credit who die when not in active service is equal to one-half the active member death benefit.

## 5. Deferred Retirement

### *Tiers 1-4:*

A member with at least 5 years of credited service who ceases teaching has a vested right to receive a deferred service retirement benefit. A member with at least five, but less than ten years of service credit, has the choice of receiving a refund of their member contributions with interest or a deferred service retirement benefit. A member with ten or more years of service credit will receive the deferred service retirement benefit.

### *Tiers 5 and 6:*

A member with at least 10 years of credited service who ceases teaching has a vested right to receive a deferred service retirement benefit. Members with less than 10 years of credited service who cease teaching may receive a refund of their member contributions with interest.

## 6. Member Contributions

Certain Tier 1 and 2 members may elect to contribute in order to receive an additional benefit upon retirement. Tier 3 and 4 members are required to contribute 3% of pay to fund a portion of their benefit. Effective October 1, 2000, such contributions cease upon the attainment of the earlier of 10 years of service credit or 10 years of membership. Tier 5 members are required to contribute 3.5% of their salary throughout their active membership.

Tier 6 members are required to contribute throughout their active membership. From 4/1/2012 through 3/31/2013, all Tier 6 members were required to contribute 3.5%. Beginning 4/1/2013 members are required to contribute in accordance with the following schedule:

<u>Salary</u>	<u>Contribution Rate</u>
\$45,000 and less	3.00%
More than \$45,000 to \$55,000	3.50%
More than \$55,000 to \$75,000	4.50%
More than \$75,000 to \$100,000	5.75%
More than \$100,000 to \$179,000 (the limit currently equal to the NYS governor's salary)	6.00%



## APPENDIX 17 (Cont'd.)

For purposes of administration, a Tier 6 member's contribution rate in any given year is based on regular compensation earned two years prior. During the member's first three years of membership, he/she will contribute a percentage based on a salary projection provided by the employer.

### 7. Cost-of-Living Adjustment (COLA)

A permanent, annually-adjusted cost-of-living benefit is provided to both current and future retired members. This benefit was first paid commencing September 2001, and is increased every September thereafter, to retired members who meet one of the following eligibility criteria:

- Age 62 and retired for 5 years,
- Age 55 and retired for 10 years, or
- Retired for 5 years under a disability retirement.

The annual COLA percentage is equal to 50% of the increase in the annual CPI; not to exceed 3% nor be lower than 1%. It is applied to the first \$18,000 of annual benefit. Additionally, commencing September 2000, members retired before 1997 are eligible for a "Catch-Up" supplemental benefit upon satisfaction of the above eligibility criteria.